SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

THE AYRSOME IRONWORKS, MIDDLESBOROUGH.

Messrs. Gjers, Mills, and Co., the owners of these works, laid the foundations of two blast-furnaces in March, 1870, which are now in successful operation, having been blown in March 29, 1871. The building of two more furnaces is being proceeded with. The works are built from the designs and under the superintendence of the managing partner, Mr. John Gjers.

The two furnaces erected are 85 ft. in height, 25 ft. in width at the bosh, and stand 78 ft. apart at their centres. The appliances and machinery in connection with them are of the most approved kind, such as experience has suggested in favour of economy of labour, steam-power, and fuel. These matters have been carefully studied at the ironworks in the neighbourhood of Middlesborough, and have contributed in a great measure to the expansion of its trade, as much, perhaps, as local circumstances. The Ayrsome furnaces are built with white bricks, the stoves and engine-houses all being faced with white bricks. Each furnace rests on four brick pillars, the barrel is bound with wrought-iron hoops, increasing in distance towards the top. At the top they are entirely closed by the usual cup and cone apparatus. Each furnace is blown with three tuyeres; the muzzles of those now used are 3½ in., but their diameter will shortly be increased. The present make of pig-iron from each is about 20 tons per cast; this is intended to be increased to about 30 tons per cast, or 420 tons per week, when the full volume of the blast is given. The temperature of the blast at the tuyeres is 1150°, indicated by its melting pure zinc in six seconds, according to the vibrations of a pendulum; the compression is 4¼ lbs. per inch. Six stoves are provided for each furnace, placed immediately behind; each stove contains two rows of cast-iron pipes, corrugated internally, 16 ft. in length, affording an increase of heating surface as compared with the ordinary plain pipes. Each row consists of seven double pipes; the total heating surface in six stoves amounts to 10,000 square feet. The cold-blast pipe from the blowing engines is 5 ft. in diameter, and passes immediately behind the stoves; a branch pipe is brought from it to each stove fitted with a valve, which pipe again divides into two; each division joins to a row of pipes within the stove, the blast passing completely through the series of U pipes to the other side, whence the hot blast passes through breeches pipes into the hot air pipe, from which the three tuyeres are supplied from six stoves. The down pipe from each furnace is wrought-iron, lined with brickwork; this conveys the furnace gas to an underground arched culvert, with suitable traps to give access for cleaning it. A cast-iron pipe from this to each stove furnishes the supply of gas sufficient to heat the air without the use of a particle of coal. Each stove is provided with two iron chimnies and dampers.

The calcining kilns and gantry are in one line, placed a distance of 35 feet from the stoves. There are four calcining kilns, on Mr. Gjers' patent, as applied to many other works; each has a capacity of 10,000 cubic feet, and each is capable of calcining 1000 tons of raw stone per week. The height from surface to the rails on gantry is 33 feet, of which there is 18 inches for the base of the kilns, and 4 feet for the girders at top, leaving 27 feet 6 inches the height of the kiln. The diameter is 24 feet. Each kiln is provided with two cast-iron cones at the bottom, one above the other, which serve the purpose of distributing air throughout the kiln, and of concentrating the material at the sides. In connection with these furnaces, and in the same line with the kilns, are two coke hoppers, each containing 100 tons of coke; and bunkers, separated by brick pillars, for the storage of iron ores, limestone, coke, and coal. The ores used are the Cleveland. Carboniferous limestone from Weardale, and Durham coke is used solely in the blast-furnaces. The same arrangement of hoppers, kilns, and bunkers will be repeated in a continuous line for the two blast-furnaces in course of erection.

The Pneumatic Lifts are on Mr. Gjers' principle, as applied at Linthorpe, Tees Side, and other works. The furnace lift, placed between the furnaces, is designed to supply two furnaces only. The open-topped central tube, 30 inches diameter, has four wheels fixed to it at the summit, over which run four wire-ropes, connecting the carriage to the air piston within the tube. The piston is 5 tons weight, fitting accurately the inside of the tube. To raise the carriage with the materials upon it, about 3 lbs. of exhaustion is produced under the piston, the latter aiding by its weight. In the descent of the carriage and the raising of the piston, about 3 lbs. of compression is produced under it. The carriage has the tube as its guide in the centre. The steam-engine to work this appliance has two 12-inch cylinders, 14-inch stroke, placed diagonally, acting direct to one shaft; from the end of this shaft two vertical open-topped air pumps are worked, 30-inch diameter, 20-inch stroke. The gantry lift is 34 feet. The weight to be lifted here amounts to 15 or 16 tons, requiring proportionate exhaustion and compression. There are two open-topped air tubes, each 48-in. diameter, fitted with 5-ton piston, and two wheels at the summit. For heavy lifts the exhaustion under the two pistons is about 6 lbs. per inch. The steam-engine for this lift is a duplicate of that at the furnace lift. The wagons are run on the gantry, over two lines of rails, carried on wrought-iron girders; the empty wagons will ultimately, when the entire range is completed, be dropped down at the opposite end of the gantry.

Two blowing-engines are erected, of the vertical, direct-acting, self-contained class, on the same principle as those first introduced by Mr. Gjers at the Linthorpe and Tees Side Ironworks, and there is room for a third engine in the same building. The three will be duplicate engines. The two already erected are by Messrs. Cochrane, Grove and Co., Ormesby Ironworks, one of which will suffice to supply two furnaces. Each steam-cylinder is 40-in., blowing-cylinder underneath 96-in., stroke, 4 ft.; steam is used expansively, cut off at ⅝ths stroke; the steam pressure is 50 lbs. The piston-valve is adopted; motion is given to it by an eccentric, a vertical rod, and crosshead, the main shaft being nearly level with the floor. On this shaft two fly-wheels are fixed, each 10 tons in weight, and balanced so as to equalise the weight of the piston, piston-rods, crosshead, and connecting-rods, which are probably 4 tons in weight. The motion bars are metal on metal. The engines draw air from the outside of the building through a 6-ft. tube. Each blowing-cylinder is fitted with three sets of inlet and outlet valves; the inlet-valves are enclosed in a chamber of sheet-iron on one side, and the three sets of outlet-valves by a similar chamber on the other side. The outlet pipe from each chamber is 3 ft. to its junction with the main blast pipe. The engines at present go at the rate of 21 strokes per minute, each supplying 8444 cubic feet of air per minute, and when driven to their intended working speed of 36 strokes per minute, 14,476 cubic feet per minute will be supplied. The house is covered by a tank for water. Six plain cylindrical boilers, 60 by 4½ ft. each, supply steam at 50 lbs. pressure; they are covered with Jones's non-conducting composition, and the steam pipes (12-in.) are similarly covered. The fittings comprise two safety-valves, one Hopkinson's valve, glass gauge, and one sludger to each. The feed-water is supplied from the Stockton and Darlington Waterworks, and is first passed though a heater and heated by the exhaust steam to 212° temperature. The boilers are heated by the furnace gas. Between the boilers and the engines a superheater is erected, also fired by the furnace gas. The cost of fuel in the Cleveland district is considerable, owing to the distance it is conveyed from the Durhnm collieries. These appliances, however, will materially diminish the waste of steam and consumption of fuel in ordinary practice. Four other boilers are intended to be erected of the same size. The chimney for the whole is 110 ft. in height.

The pumping-engines are placed in a separate building, and were made at Mr. John Cameron's works, Manchester. One of these fills the tank with its water for the supply to the tuyeres and water heater; it has two 10-in. rams. The other engine feeds the boilers from the heater referred to; it has two 6-in. rams. A reservoir 60 ft. in diameter, 10 ft. deep, is constructed to receive all the waste water from the tuyeres, the drainage from the sand beds, &c. From this reservoir the general supply for the works is drawn.

KILBURNE COLLIERY, DERBYSHIRE.

Kilburne Colliery, situated near the town of Derby, is the property of Mr. Ray, whose family have worked it under the management of Mr. Bailey for the last forty or fifty years; it has lately been let to Mr. Small, one of the managers, who will carry it on for the future. The underground workings at this colliery are, perhaps, as extensive as any in the Midland Counties, there being five or six miles of roading to one single shaft. The Kilburne coal, well known for its superior quality and fitness for household purposes, is about 4 feet in thickness, and of a very long grain, so that it is brought up to the surface in large lumps. The roof over the coal is exceedingly bad, so much so that the roads are almost solid timber tunnels, and in the workings timber trees are not sufficiently strong to hold it up whilst the coal is being obtained, and cast-iron "puncheons" or props have to be used. The coal is worked upon the long wall system, and taken clean out. The coal measures crop out in this colliery, and consequently some of the workings, which extend about a mile and a half from the shaft, are very shallow. Near the crop there are two shafts, one used as a furnace-shaft for ventilating the pit, and the other, supplied with a windlass and rope, can be used as a means of egress for the men in case of danger.

The winding is done at the main shaft by a high-pressure beam-engine, having a cylinder 20 in. in diameter, and working a 4-ft. stroke, upon a cast-iron frame. A strong foot-brake is attached to the fly-wheel. Steam is supplied from two cylindrical boilers, one 29 feet long, by 3 ft. 6 in. in diameter, and the other 29 ft. long by 4 ft. in diameter. The dampers in the brick flues of these boilers are worked by a very ingenious appliance, designed by one of the engine-drivers or tenters. So long as the steam does not exceed the working pressure the damper remains open, but is immediately closed upon that pressure being passed. A small valve is fixed to the boiler similar to a safety-valve, but the escaping steam from it is conveyed by a pipe to the bottom of a small cast-iron cylinder, in which there is a solid metal piston. The piston-rod is connected to the damper by a chain, and when the steam raises the piston to escape at a pipe near the top of the cylinder the damper descends, and is closed by its own weight. When the steam is blowing off the piston remains at the top of the cylinder, but directly it ceases the piston descends, and raises the damper. This is a very simple contrivance, and it is found to act very well. The winding apparatus, worked by a pinion and crown-wheel from the crank shaft, consists of two iron drums fitted with arms to receive the flat hemp ropes. A lever-brake is placed upon the drum-shaft. The double pit-frame or headstock over the pit mouth is composed of deal and oak, and surmounted by two 10-ft. flat pulleys. The ascending and descending cages work in the one shaft, which is traversed by four wooden guides. The ropes are of hemp, 204 yards long each, by 5 in. by 1¼ in. At some little distance from the winding-engine stands a powerful high-pressure vertical pumping engine. The cylinder is 40 in. in diameter, and the stroke 10 ft. A large double beam is connected to the cross-head on the end of the piston-rod, by means of two strong side rods, one on each side of the cylinder; the beam is, therefore, supported in its carriages on stone blocks a little higher than the engine-house floor. The pump-rods are attached to the opposite end of the beam, which protrudes from the engine-house through a wood-covered opening. The pumps are in two lifts, 65 yards each; the working barrels are 14½ inches in diameter. There are two capstans and one wind. The engine-house is a massive brick building, with stone facings and frames round the doors and windows.

Steam is obtained from three cylindrical boilers, each 35 ft. long by 4 ft. diameter. These are placed alongside the engine-house, under a corrugated iron roof. So much timber is required for the pits that a large circular saw is kept continually employed preparing it. This saw is driven by a small horizontal engine, having a cylinder 11 in. diameter, and working a 2-ft. stroke. The engine obtains its steam from two cylindrical boilers, one 22 ft. long by 4 ft. diameter, and the other 29 ft. long by 5 ft. diameter. At this engine there is a pump, and also a large injector, which force water into a wrought-iron reservoir to supply the other engines. A small horizontal engine, with cylinder 6 in. diameter, and working a stroke of 1 ft. 8 in., is used on the pit bank for drawing the spoil to the top of a mound. The steam for this engine is conveyed through wrought-iron pipes from the winding-engine boilers. Descending the shaft, we found near the bottom stabling sufficient to accommodate 40 or 50 horses. These are composed of brickwork whitewashed, are very clean, and well ventilated. A short distance from the shaft, towards the workings, there is a weighing-machine, over which all the coal passes, and is weighed. The lever of the machine is in a brick house at the side of the road. Not far from this machine there is a horizontal engine used for drawing coal up long inclines. This engine is placed in a lofty brick house, and has a cylinder 12 in. in diameter, and works a 2-ft. 4-in. stroke. The steam is conveyed down the shaft from the saw-mill engine boilers. There are two drums, 6 ft. diameter, geared from the fly-wheel shaft, and so arranged that they can be disengaged to let the skips down the inclines. The length of ¾-in. wire-rope to these drums is 3300 yards. On the inclines there are double telegraph wires connected to a battery and bell in the engine-house, and should it be found necessary to stop the skips on their journey the man or boy on the incline places his lamp or some other conductor against the two wires, this connects the current of electricity and rings the bell in the engine-house. Extending from this engine there are several long lengths of brick arching. Further on in the workings, where the roads dip towards the shaft, there are three "jigs" or brakes, with wire-ropes, fixed at the top of the long inclines, on which the loaded skips going down pull the empty ones up. In the gate-roads tin oil lamps are used, and are so made that they can be hooked on the belt in front of the person carrying them.

On the surface, part of the coal is loaded into trucks, and conveyed over a large weighing-machine, on a line of railway belonging to the colliery, which joins the Midland Railway at Kilburne Station. A large quantity of the coal is taken to the canal, about three miles distant, in wagons; the body of each wagon is lifted off the wheels, as it is, loaded, by a crane, and placed in a boat. In this way it is taken to Derby and neighbourhood, where the loaded wagon body is lifted out of the boat and placed on a cart, and conveyed to its destination; the wagon body is then returned to the colliery, to be again filled. This plan saves a great deal of trouble, and prevents the coal from being broken into small pieces, which would sure to be the case were it thrown in and out of the boats and carts. The remaining portion of the coal is sold to persons bringing their own carts, and a separate machine is provided for weighing these carts. In this colliery there are carpenters' and blacksmiths' shops, stores, and extensive stables. There are also good offices, and two very pretty and substantial cottages, in which the machinemen live.

THE SHEEPBRIDGE COMPANY, DERBYSHIRE.

There is probably no mining district in the kingdom which in the course of a few years has grown with such rapidity as that known as Whittington, near Chesterfield. Labour, the great lever of civilisation and founder of cities and towns, combined with energy and confidence, has been the means of raising the place from a moor to something approaching a well laid out and rather lengthy town. Individual enterprise and perseverance, essentials to success, have been the means of benefiting vast bodies, and planting thriving and prosperous communities; and those qualities have in very few instances borne fruit so rapidly as they have at Whittington Moor, where are situate the extensive ironworks and collieries of the Sheepbridge Company. Some 14 or 15 years ago there were very few houses between Chesterfield and Whittington Moor, whilst now there are more than 1000, and building operations are going on in all directions. All this change has been the natural result of the development of the mineral wealth of the locality, and the establishment of the ironworks. This, we believe, was in a great measure the work of one man, Mr. W. Fowler, now one of the county magistrates, and brother of the eminent engineer. Knowing that the district contained valuable seams of coal and ironstone, that gentleman, in conjunction with his brother, and afterwards with Mr. Hankey, banker, of London, about 14 years ago commenced working the coal. A large area of land was leased, and after sinking to the minerals a part of the coal field was sub-let to other companies. Two of those sub-leases lapsed, and the collieries are now worked by the Sheepbridge Company. On the coal and ironstone being reached blast-furnaces were erected, ultimately reaching the number of five, and an extensive manufacture of cold and hot blast pig-iron entered upon, and soon the moor exhibited indications of active, instead of still life, as before. In the year 1864 the works were purchased by a number of gentlemen, and took the name of the Sheepbridge Coal and Iron Company (Limited). Mr. W. Fowler was appointed Chairman and managing director of the new company, a position which he held up to the close of the year 1868, when Mr. J. Stores Smith assumed the office of managing director, Mr. Fowler retaining the chairmanship. It is through the courtesy of those gentlemen that we have been enabled to give the subjoined sketch of the works. Before doing so, however, it is worth noticing as a result of the development of the minerals of the district that whilst the population of Whittington had rapidly increased after the opening of the works to 2863 in 1861, at the recent census that number had increased to 5779, so that the population had more than doubled in 10 years.

The Sheepbridge Works are situate quite close to the Midland Railway, on what may now be termed the main line between Sheffield and Chesterfield, and about three miles from the last-named town. There are five iron-cased furnaces, all of them in blast. They are about 52 ft. in height, four of them being 15 ft. and the other 17 ft. in the bosh, there being five tuyeres to each furnace. The driving-engine is an 82-in. cylinder, and the blowing-engine an 89-in. cylinder, with 8-ft. stroke. The boilers are of the ordinary character. There is a hydraulic-lift by which the iron, coal, and other material for smelting are supplied to all the furnaces, the coal required for them being about 200 tons daily. Both hot and cold blast pig is produced, the output of both being between 700 and 800 tons weekly. The cold-blast iron is made exclusively from the native Derbyshire stone, which is calcined, and largely used in the manufacture of armour-plates. The hot-blast is made from a mixture of the native ore and that of Northamptonshire, and about 200 tons of the latter are brought into the works daily.

About the period of the establishment of the limited company a foundry was added to the works. The foundry is about 160 feet in length and 72 feet in width, having all the usual appliances. The trade carried on is principally in general castings, especially large ones for steam-hammers, and similar purposes, not unfrequently reaching the weight of from 20 to 40 tons.

In the year 1868 a forge was established, chiefly with a view to the manufacture of tyres and light rails. The Rail Mill consists of a 20-inch train, driven by a pair of horizontal engines, each of 40-horse power. The tyres are made on the coil system, and the mill is capable of rolling about 600 tyres weekly. The total out-put of the forge in finished iron of all sorts is about 250 tons weekly. There are four

steam-hammers, one of 6 tons, one of 4 tons, and two of 50 cwts. each. There is all the usual requirements necessary for the production of mill material.

The advantages to be obtained from having the coal and slack used in the making of coke cleaned and screened have been fully recognised at the Sheepbridge Works, and Mr. Birkbeck, the company's engineer, has patented an invention for that purpose. Three of the machines are worked, cleaning a large quantity of small coal daily. The coal passes through two sets of crushers, and as it is riddled it passes into hoppers, and is conveyed to the ovens. The invention is a valuable one, and several of the machines have been made by Mr. Oliver, of Chesterfield, for other establishments.

There are eight double puddling furnaces, on Griffith's patent, with some additional improvements made by Mr. Birkbeck, the company's engineer. The principal objects attained by the patent furnaces over the ordinary ones are a saving of fuel and in skilled and unskilled labour, and at the same time producing a good quality of iron. The invention mainly consists in the application of steam to the puddler's bar or tool, and so relieving him of a great part of his exhausting labour, besides enabling him to get his "turn" done in considerably less time, and at a much less cost. That those desiderata have been attained is shown by the fact that the furnaces have been at work for some time at Sheepbridge. The puddling machinery is driven by a small engine of about 8-horse power.

The collieries worked by the company are four in number. The Sheepbridge Colliery is sunk in the freehold land belonging to the company, in the centre of the works. The coal worked is the Top Hard, locally known as Potter's coal. The shaft is about 75 ft. deep and 11 feet in diameter, and there is a pumping-shaft of the same dimensions. The cage is a single-decked one, and there are a pair of 20-horse power engines for drawing. There are two 20-in. pumps, worked by a couple of 20-horse power engines. The quantity of coal raised is about 250 tons a day.

Dunston Colliery is rather more than a mile from the works, at the edge of Cobnar Wood. The seam of coal worked is the well-known black shale or Silkstone, the most valuable bed in the district. There are two drawing-shafts, 109 yards in depth and 7 ft. 6 in. in diameter, and a pumping-shaft 112 yards deep and 9 ft. in diameter. For drawing there are two engines, each of 35-horse power, and a 200-horse power engine for pumping. The present daily out-put is about 250 tons; but the colliery has not been worked to its full capacity, and it is expected that next winter as much as 3000 tons a week will be raised.

The Nesfield Colliery also works the Black Shale seam, and is situate about two miles from the works, near to the village of Barlow. There is a drawing and a pumping shaft, each 70 yards deep and 9 ft. in diameter. The drawing-engine is of 35-horse power, and the pumping-engine of 20-horse power. The daily yield of the pit is about 250 tons.

About nine miles from the works, at a place called Killamash, is the Norwood Colliery, where the Top Hard coal is raised. The drawing and upcast shafts are 165 yards deep and 13 ft. in diameter, and as the water is tubbed out by about 80 yards of iron plates, there are no pumps. There are two drawing-engines, each of 75-horse power, and at the bottom of the pit there are a pair of hauling-engines, of 25-horse power each. The quantity of coal raised from the Norwood Colliery is from 700 to 800 tons a day, of which about 250 tons is sent to the Sheepbridge Works, for the use of the blast-furnaces and other purposes, the Midland Company having a branch line of railway from Eckington up to the colliery. All the collieries are ventilated by means of furnaces, but one of Guibal's fans is about to be introduced.

The men belonging to the collieries, we understand, are all non-Unionists, and it is worthy of remark that accidents of a fatal character are of rare occurrence, as the pits do not take much gas. The total quantity of coal raised by the company is about 10,000 tons weekly, of which an average of 3000 tons are used in the various operations carried on at the works; about 6000 tons are sold in different markets, the Black Shale going principally to London and the South, where it is a favourite house coal, besides being largely used for gas-making purposes; and 1000 tons are converted weekly into coke. The coke is made from the small coal of the Black Shale seam, after having been washed by Mr. Birkbeck's machine. The company have a large number of coke ovens, the produce of which is in brisk demand. The ironstone pits are situate at Barlow and Whittington, the ore at the former place being found near to the surface, and worked by "gins," and at the latter by engine-power, and worked in the ordinary manner. The lessors of the minerals are the Duke of Rutland, the Duke of Devonshire, Rev. M. Broomhead, the trustees of the Dunstan Estates, and Mr. C. S. C. Pole. To carry the immense traffic in coal &c., the company employ about 1000 of their own wagons. The total number of men and boys employed at the works and collieries is upwards of 2000, and the wages paid weekly exceed 2000*l*. There are 70 houses and cottages near to the works for officials and workpeople. The works of the company stand out prominently as seen from the Midland Railway, and they cover about 30 acres of their own freehold land.

LITHOFRACTEUR—A NEW BLASTING MATERIAL.

Whilst admitting the perfect adaptability of nitro-glycerine, and compounds containing it, for the purposes of blasting and mining, it cannot be denied that there is an element of danger in the use of these substances. In nitro-glycerine, for example, the danger exists in manufacture, storage, and use; in the latter substances it exists only in manufacture—that is, before the nitro-glycerine is converted into blasting material. After that we get safety, both in use and storage. But an advance upon this would be immunity from accident in all these stages, presuming the disruptive power of the compound to be equal to, if not greater than, that of dynamite. A series of experiments has recently been carried out which tend to prove that the material experimented with possesses in a high degree all those elements of safety and power. The nitro-glycerine which it contains is prepared in a special way, so that there is no danger in manufacturing this new compound, whilst its perfect safety in use has been thoroughly demonstrated by the inventor within the last few days in England. The compound is termed Lithofracteur, or stone-breaker, and was invented by Prof. Engels, of Cologne. It was used during the late war between Prussia and France, and is extensively employed in Germany for mining purposes, and the manufacturers intend now to try whether it cannot be made equally conducive to the interests of peace in England. With this object it has been recently subjected to a number of tests of a searching character. At the invitation of those directly interested in the success of the new explosive, a party of gentlemen recently proceeded to Shrewsbury to test the properties of lithofracteur. The experimentalists consisted of Prof. Engels, the inventor of lithofracteur, and a partner in the firm of Krebs Brothers and Co., of Cologne, the manufacturers of the compound; Mr. Kirkmann, of Cologne; and Mr. Perry F. Nursey, C.E., engineer in England to Messrs. Krebs. The visitors were—Capt. Harvey, R.N., the inventor of the torpedo bearing that name; Capt. McEvoy, of the London Ordnance Works; Mr. Brown, of the chemical department, Woolwich Arsenal; Mr. Thomas Cargill, C.E., Assoc. Inst. C.E.; Mr. Hockin, of the St. John del Rey Mining Company; Mr. Faviell, Mr. Comyn, Mr. Houlden, &c. The arrangements connected with the trip were made by Mr. Kirkmann, who spared no pains to make it agreeable, which he fully succeeded in doing. Upon the arrival of the party at Shrewsbury Prof. Engels, Mr. Kirkmann, Mr. Faviell, and Mr. Nursey proceeded to the quarries at Nantmawr, about 22 miles from the town, and to mark out the holes to be jumped for the next day's experiments. The selection of holes was made by Mr. Faviell, who is an experienced quarry proprietor, and who took especial care to choose spots which were calculated to put the lithofracteur to the severest test.

The object proposed to be accomplished by the experiments was the demonstration of the following points:—First, that lithofracteur is not in any degree explosive, or what is usually termed dangerous, except under the conditions of absolute work; secondly, that, by reason of small bore-holes only being required, by not being affected by damp, and for other considerations, it is exceedingly well suited for blasting mining operations; and, thirdly, that it possesses some peculiar properties inherent in itself. Before describing the experiments it will be necessary to define the composition of the material, and the usual manner in which it is manipulated and applied to the purposes mentioned. The ingredients of which it is composed are nitro-glycerine, gun-cotton, infusorial earth, and the ordinary components of gunpowder, together with one or two other substances. It can only be exploded by explosive bodies, percussion caps, red-hot metals, sudden heating to a high temperature, or by a very heavy blow and concussion. If brought into contact with a flame or burning fuse, it burns away like wet gunpowder. A great saving of time and labour is effected in using lithofracteur, as merely small bore-holes and simple tamping are required; in many cases no boring is necessary. The tamping only requires to be loose, and the best results are obtained by a thin pressed layer of moist clay, loam, turf, sand, or even water. When no bore-hole is made, the cartridge is laid either on the mass to be blasted, or placed in any cleft or fissure, and the same tamping is used as above.

The explosion is effected by means of percussion caps, which are fastened on to fuses. The open end of the cap is first attached by pincers to the fuse; the cap is then nearly entirely inserted in lithofracteur and the fuse bound tight with string to the cartridge to prevent the cap slipping out of its place. No noxious gases are generated by the explosion. In storing it care is taken to keep it separate from other oxplosive materials—percussion caps, and from those liable to spontaneous combustion. The temperature is never under 55° or above 300° Fahrenheit. If the compound becomes frozen it is either placed in a warm room until it is again plastic, or in a vessel put into a bucket filled with hot water. The transport of lithofracteur is at present under the same restrictions as nitro-glycerine and other easily exploded substances, but when it is known that its transport is not attended with any danger, it is to be hoped that some modification of the present prohibitory Act may take place. In the experiments the size of the cartridge used was 4½in. long by ⅞ in. in diameter, being intended to fit easily into a 1-in. hole. Their weight was, without the paper envelope, 1¾ oz., and 2 ozs. each when wrapped ready for use.

The first experiment at Nantmawr (where the rock is a fine carboniferous limestone, the lower portion being used as a flux for iron, and the upper strata being burnt for lime by Mr. France at the quarries), consisted in placing 5 lbs. of cartridges in a box, carrying it up to the top of the quarry, which was 150 feet in height, and throwing it down. This was done to prove that a concussion or violent shock of this character produced no effect upon lithofracteur. The material was flattened out in the cartridges, but no other result was produced, except the splintering to pieces of the box. The fact that simple ignition was insufficient to produce explosion was shown most convincingly by lighting a cartridge with an ordinary fuse, when the contents burned away in a perfectly harmless manner. The next experiment was undertaken to display the effect of the explosive when simply laid upon the surface of a stone or other substance, without any tamping. A stone was selected, one cartridge laid upon it, and fired with a capped fuse. The result was that two large portions of the top of the stone were split off, in a wedge-like shape. One or two preliminary experiments followed, which were made upon large loose stones, and not upon the solid rock; in one of them one half cartridge did several times the amount of work that double the weight of powder would have effected, with a hole which only extended 4½ in. deep into the stone instead of 9 in., which was the depth that would have been required had powder been used.

But the superior value of lithofracteur was fully demonstrated by charging holes with it, which were bored in the vertical face of the rock, in positions in which the ordinary powder would not have been used. One of these was 3 ft. 4 in. in depth and 1½ in. in diameter. The charge consisted of 17½ oz. of lithofracteur, and the effect was tremendous. An aperture was made in the rock round about the original hole, which at the entrance was 3 ft. by 2 ft., and the rock was cracked and fissured in all directions over an area of 20 ft. by 12 ft. 6 in. Other experiments were then made with charges placed vertically, horizontally, and inclined at different angles to the perpendicular. Water tamping was used, and the results were of the most satisfactory nature. One of these experiments is particularly worthy of notice. The hole was bored vertically on a ledge well back from the surface of the rock. Its diameter was 1¼ in, and its depth 4½ ft. The charge was 7½ oz., and over 20 tons of rock were dislodged by the explosion, a mass in the rear of the blast holes being cracked and rent ready for easy removal. This result astonished the quarry labourers more than any other of the blasting experiments performed.

The most convincing proof of the tremendous downward force exerted by lithofracteur was afforded by the experiments on pieces of rail. Two of these experiments were performed, but as the last was the most severe trial for the material it will suffice for our description. A couple of rails of the double-headed section, weighing 75 lbs. to the yard, were laid one on top of the other flatwise, upon sleepers placed about 4 ft. apart. Some more sleepers were placed on the ground, over the charge, and the whole fired. The charge was not put up in cartridges, but consisted of 20 ozs. of lithofracteur, simply placed in a lump on the centre of the rail. The explosion was terrific, sending the sleepers in large and small fragments high up in the air, and breaking the two rails clean in halves, besides making a great crack in one of the severed portions.

It has been stated that this new material is not liable to be exploded by concussion, and in order to determine the matter it was proposed by Mr. France to arrange a collision with features analogous to those attending a railway collision. Mr. France liberally offered the use of some of his wagons for the purpose, although every experiment involved the destruction of two wagons. There is an incline upon which a double line of tramways laid, reaching to the quarry pit, having a length of about 600 yards, and a gradient of 1 in 8. It would be difficult to find a spot better suited for the purpose. A wagon was placed at the bottom of the incline, having wooden buffers, and another at the top. In front of the buffers of this upper one were tied a couple of cartridges, and all being ready it was allowed to run down the incline. The speed was something tremendous; but, although the wagons were smashed up no explosion occurred, the lithofracteur being found smeared over the debris. Two more wagons were prepared, one with wooden and the other with iron buffers, and the experiment was made in the same way as before. Upon the collision taking place there was a very slight report, as was also the case when the wheels of the wagon passed over the two cartridges tied on the rails. In each case, however, the explosion was confined to the minute particles struck, and did not extend to the remainder of the compound, which was found spread about the rails and in the vicinity of the collision. It will be seen that these three experiments practically demonstrated the fact that no dangerous explosion could possibly occur in a railway collision or similar accident, no matter whether the compound were jambed between wood and wood, iron and wood, or even iron and iron. Mr. Brown, from Woolwich Arsenal (at whose suggestion the iron and wood, and the iron and iron tests were made), expressed himself as being perfectly satisfied with the results, which, we think, cannot fail to convince railway companies of the little risk that would be incurred in carrying this substance.

On the following morning the party started for the locality of two other quarries, also leased and worked by Mr. France, and situated about 18 miles from Shrewsbury. These were the Belan and Breidden quarries, and the stone there was of a much harder description than that at Nantmawr, being a very compact greenstone. Similar experiments were conducted at these quarries with equally satisfactory results. If anything, the results were rather better than those of the previous day, and there is no doubt that the harder the rock, and the more impenetrable the substance, the better is it adapted to develope the full capabilities of the new explosive agent. An interesting water experiment in the River Severn concluded the programme. A raft 8 ft. by 4 ft. was constructed of rough timbers, and a box containing 3 lbs. of lithofracteur, in cartridges, was securely fastened to the under surface of it. The raft was then towed out into the middle of the stream, where the water was nearly 6 ft. deep, and loaded with stones until it sank to the bottom. About 20 ft. of Bickford's patent fuse, which was used in all the experients, was attached to the charge, and a light applied to the end. After a few minutes a violent explosion took place, a magnificent *jet d'eau* nearly 70 feet in height shot up in the air; some of the large stones were projected to a considerable distance, and the surface of the water was strewn with the debris of the raft, a number of fishes being killed by the explosion. This experiment was made in order to afford Capt. Harvey the opportunity of witnessing the power of lithofracteur under water, the gallant captain being desirous of obtaining a really safe and, at the same time, a very violent explosive compound for his torpedo. He expressed himself perfectly satisfied with the results, which were certainly most striking.

The whole of the experiments were conducted with the greatest care and the utmost fairness, and were made in a way which showed the confidence of the operators in the substance they were dealing with. There is no doubt that the great want of the present day for blasting and quarrying is a material similar to that we have been discussing. But the use of these substances is practically prohibited by the Nitro-Glycerine Act. No matter how safe they may be, so long as they contain one atom of nitro-glycerine they come under that Act. The safety of blasting compounds containing nitro-glycerine having been so thoroughly proved, the day is not far distant when a modification of the above Act will enable quarry proprietors to take advantage of its useful properties. It is their common complaint that the Nitro-Glycerine Act debars them from using substances specially adapted for their purposes. All that is required to pave the way for their introduction into this country is a knowledge of the tremendous power they possess combined with great security.

LITHOFRACTEUR, AND ITS SAFETY.

SIR,—It will be acknowleged, I think, that the experiments with lithofracteur, to which you referred in last week's Journal, have proved that nitro-glycerine can be so mixed with other substances as to render it comparatively harmless, but what I should like to know is whether this mixture is really a stable mixture, because it is to this question entirely that the reply would have to be given whether lithofracteur and similar compounds are as safe as gunpowder. With many substances the stability or instability of an explosive mixture would be of little importance, because partial separation, or separation at least to a small extent, would not be productive of great danger; but in the case of nitro-glycerine compounds it is different, because we know, by actual results which have occurred within the last few weeks, that even in the hands of a professor of chemistry of experience in, and favourable to, the use of nitro-glycerine an accidental explosion of only ten drops of nitro-glycerine sufficed to produce a dangerous explosion; and it is surely not unreasonable, therefore, to enquire whether the separation of so small a quantity as this from a barrel or jar of lithofracteur is absolutely improbable; for we must not lose sight of the fact that although a hundredweight of lithofracteur will burn away harmlessly if unconfined, the accidental explosion of only a dozen drops of the contained nitro-glycerine if separated would produce sufficient concussion to explode the whole mass, producing an effect capable of shaking an entire town.

Under these circumstances it would seem to be most important well to consider the character of the material used for mixing the nitro-glycerine with; for if it be non-absorbent, as silex, alumina, &c., the danger of separation would uppear to be much greater. It is for this reason that the proposition to use cotton as the absorbent appears to me to be most valuable, since the separation of nitro-glycerine when once absorbed would be far more difficult. The case appears to be like this. If we pour twenty drops of water at the top of a plate of clean glass a foot square held obliquely the greater portion will run off, but if we pour the same quantity at the top of a similar sized piece of soft woollen cloth not a drop of the water will reach the bottom—all will be soaked up by the cloth. In mixing the nitro-glycerine with gun-cotton, then, there would be the double advantage of diminishing the danger whilst retaining the strength; and although I am inclined to prefer the compressed gun-cotton to any form of nitro-glycerine as a blasting agent, I think if the latter is to be used at all we cannot do better than use it mixed with—

GUN-COTTON.

THE NEW BLASTING COMPOUNDS.

SIR,—Of the experiments with lithofracteur, it may be said that they were very good, and went to confirm on a larger scale what had been previously well exemplified by Mr. Nobel and myself, and, therefore, there was neither novelty or improvement; as from what has been divulged of the composition of lithofracteur, containing, as it does, 75 per cent. of nitro-glycerine with so much earthy matter other than silica, as in dynamite, there is scarcely a pin difference between them—that Mr. Nobel has some good cause for grievance in that respect; but my invention differs materially from both, in that they depend for their power almost entirely on an excess of nitro-glycerine, whereas I use a "mere modicum" of that substance, for the purpose of giving an *impetus* to other explosives material possessing no fulminating property *per se*, and I can regulate and adapt the power according to circumstances; besides which, I obviate the objection raised against nitro-glycerine, in that no acrid fumes of nitrous acid are generated by the explosion, which, in ill-ventilated mines, are likely to seriously affect the health if not the lives of the workmen, to say nothing of the saving of time.

Speaking of the probable composition of the lithofracteur, the *Times* of yesterday says it is composed principally of nitro-glycerine with a dash of gun-cotton and gunpowder with some earthy matter! Where is the honour and consistency of this? If such things are tolerated no man—no patentee, is safe. Then, the *Times* winds up with the necessity for a relaxation of the stringeny of the Act. Why, this is what I have been labouring for this long time in vain, and the recent experiments with the lithofracteur did not need any such further proof. Englishmen and English science finds little or no favour in this so-called liberal country, which claims to be the light of the world.

JOHN HORSLEY, F.C.S.

The Laboratory, Cheltenham, May 16.

DYNAMITE.

SIR,—As the question of the relative safety and advantages of different explosives is now engaging public attention, you may, perhaps, consider the following communication worthy a place in your Journal. We some time since imported a cargo of dynamite from Hamburg, which was landed at Carnarvon, and carted to Llanberis. In July last 2 tons, contained in 80 cases, were carted from Llanberis to the Menai Straits, and shipped on board a vessel for Liverpool, and there transhipped into another vessel, the Jessie, which sailed for Rio de Janiero on September 1, and arrived there on November 14. The dynamite was landed at Rio, and conveyed thence on the Dom Pedro II. Railway to the terminus of the Parabila river, 48 miles. It was then conveyed in wagons to Barbacena, a distance of 152 miles, and thence to the mines of the St. John del Rey, a further distance of 120 miles, on mules' backs, where it arrived safely on December 28 last. We had previously sent half a ton to the same mines by the route *via* the Thames instead of the Mersey, but the transit from Rio de Janeiro was the same. We have shipped to Peru, Australia, and elsewhere, without any accident whatever having occurred. We learn also from Messrs. Nobel and Co. that upwards of 900,000 lbs. have been conveyed in carts from their manufactory in Hamburg an aggregate distance of upwards of 800,000 English miles without the slightest accident. The Austrian Government, after the most searching experiments, have pronounced dynamite to be "the safest explosive known," and in 1869 authorised its unrestricted transit, and it has since that date been regularly carried on the Austrian and Swedish railways, together with ordinary merchandise, and no accident has ever taken place.

We have during the last few months received numerous urgent and pressing applications for dynamite from railway and other contractors and mining agents, in different parts of England, Scotland, and Ireland, which we have been obliged to refuse, in consequence of the prohibitory restrictions imposed by Parliament on its carriage, at the instigation of the present Government. One firm in the North of England write in great trouble. They sent us an order for half a ton having entered into a contract which is dependent on their being able to supply the contractors with dynamite; but we have been reluctantly compelled to decline serving them in the present state of the law.

That dynamite is safer to use, store, and carry than gunpowder has been abundantly demonstrated, and that it is more serviceable and

less expensive will appear from the following tabular statement, with which we have been favoured by the managing director of the St. John del Rey Mining Company, showing the actual result of four months' working at their mines—two with gunpowder and two with dynamite—from which it appears that, notwithstanding the original cost of dynamite greatly exceeded the cost of gunpowder, yet the company was enabled to do double the work in the same period of time, and at a saving of about 25*l.* per fathom as compared with gunpowder.

Comparison of Work done, and cost of same, in sinking two shafts, for four months, at the Morro Velho Mine, in blasting with gunpowder and dynamite respectively:—

Month.	Explosive used.	Men employed in blasting.	Wages paid to men for boring, &c.	Extracost. dynamite	Depth of holes bored in inches.	Diameter of holes.	Total fathoms sunk.	Cost per fathom.
Nov., 1870	Gunpowder only.	1679	£335 16	—	34,354	2, 2½	4 4 6	£70 13
Dec., 1870	Gunpdr., 29 days Dynamite, 2 days	1869	373 11	—	32,551	2, 2½	5 3 10	66 4
Jan., 1871	Dynamite	1844	368 16	£70	49,807	1, 1½	9 3 8	45 12
Feb., 1871	,, ...	1817	363 8	75	41,787	1, 1½	10 3 0	41 16

Carnarvon, May 17. WEBB AND CO.

WORKMEN'S ACCIDENTAL INSURANCE.

SIR,—The desirability of workmen being enabled to insure their lives, and thus secure the same advantage as those more favourably circumstanced, has long been admitted; but the difficulty arising from their indisposition and inability to pay the premium annually has hitherto proved insuperable. I have recently had some correspondence with an insurance company anent insuring miners, and have the pleasure to send you some of my notes in the hope that, although one society appears to think the difficulties of weekly collection too great to justify the undertaking of workmen's insurance upon that principle, some others may be found with sufficient enterprise to do so, or that we may at least have the advantage of the knowledge to be elicited by discussion upon it. A. B.

"SIR,—The want of some mode of raising relief to miners while suffering from accidental injuries has often been brought before me; and I should be glad to hear if you have considered or matured any scheme,

I am satisfied that the collection and payment of the premium should be totally independent of the coalowners. That the coalowners are sincerely willing to benefit the men in this matter I have no doubt, but any effort of theirs would (wrongly, I know) be looked on with suspicion. I am also satisfied that no collier would pre-pay a twelvemonths' premium, but he might pay a month or a week.

It occurs to me that if monthly or weekly tickets, like railway tickets, could be got, that many, *not only miners, but many other tradesmen*, would take advantage of them. The compensation should be 10*s.* a week while disabled, the sole judge of which should be the doctor of the works, and 20*l.* in the case of death. Grocers in the vicinity of collieries could be the agents. I shall be glad to give you any data or information I have. I am, &c., ——"

"Yours of —— to hand, but I still think some simple scheme might be got. It would not be necessary to collect the payments weekly, for you could send a quantity of weekly tickets to some responsible agent, in the same way as you send railway tickets to the railway agents. When a miner choses to buy a weekly ticket the seller would write the buyer's name and date upon it, and it would be good for that time—same as a railway insurance ticket is only good for the journey. I think that part of it could be managed; the principal point, perhaps, is the want of sufficient data.

In England and Scotland there are employed in mines, persons..	345,446	
The loss of life by fatal accidents in 1869 was	1,116	
The non-fatal—lamed, perhaps	5,000	
If we suppose 1116, at 40*l.*	£ 44,640	
,, ,, 5000, at 20*l.*	100,000=	£144,640

To raise 144,640*l.* by contributions from 345,446 miners would require nearly 8*s.* 6*d.* per annum—that is to say, a payment of 8*s.* 6*d.*, or (say) 10*s.* per annum, or 3*d.* a week, would cover the risk. I do not think a collier would grudge 4*d.* or 6*d.* for a weekly ticket: perhaps none of them would take them regularly, any more than railway travellers, but of course there would be no risk when they had no ticket."

"I have yours of ——, in which you state that the obstacles in the way of the weekly system of tickets are insuperable. Of course, you must be so well up in the matter that you will, perhaps, see it in a different and more safe light than I.

With regard to the masters insuring the men, the subject has again and again been considered; and I am satisfied that *that* plan will never be universally adopted. Fifteen or twenty years ago the Scotch coalmasters used to have actions brought against them by injured parties for compensation—much the same as railway companies have now; and, whether they had a claim or not, needy lawyers took the chance of a jury trial on speculation. The masters had to fight men of straw, and they gained a loss when they gained their case, because the loser could not pay his expenses: even when the poor widow, as the case might be, gained her case, the extra costs of the agent nearly swallowed up the sum awarded by the jury. At that time the question of insurance by the master was pretty much talked about, and I dare say had the scheme been well pushed a beginning might have been made. Latterly, however, the Courts have taken a more favourable view for the masters, even to the extent that the manager of a colliery is a fellow-servant; and if the master employs a competent manager he (the master) is not civilly liable for damages as regards accidents happening through the manager's neglect. On the score, then, of insuring themselves against losses, the coalowners will not now entertain the scheme. On other motives many of them would go the length of collecting the money in the same way as they collect school fees, &c.; *but they would not pre-pay the money*, nor do I think the scheme would be at all generally adopted.

I believe it would be better if the men were induced individually instead of collectively to insure. I mean if a workman could buy a ticket for himself, as I have suggested. It might be that at first only those whose occupations are specially dangerous would insure—that will be the case everywhere. Of the ultimate success of such a scheme I have no doubt." A. B.

COLLIERY WORKINGS—IMPROVEMENTS.

SIR,—The improvements in mining have been slow, and dearly bought. The loss of many lives and the destruction of much property has been the price paid for many of these improvements; but as I travel about from place to place I am glad to find that there is a growing disposition not only to gain a knowledge how to deal with accidents and emergencies, but, what is better still, to prevent them taking place. A short time ago I was kindly invited to look through the workings of the Lund Hill Colliery by the engineer, Mr. Edwd. Beacher; and I must confess I have seen many collieries, but for carrying out useful and precautionary plans I have never seen any equal to Lund Hill. It will be remembered that Mr. Beacher succeeded the late Mr. John Smith, who was killed at the Oaks Explosion. When Mr. Beacher entered upon his official duty the company was about to open out a larger area of coal. This naturally brought out the idea that they must increase the ventilation. Mr. Beacher set about enlarging the air-courses, and improving the furnace; but when he had done all he could it was evident that only a small margin could be got over what was required for immediate use—so that it was clear if the ventilation must be increased some other means must be tried. Mr. Beacher then began to calculate and devise plans for sinking a new shaft. When he had well studied and matured his plans and section, he set practically to work, and in about two years he sunk a shaft 220 yards deep, 14½ in. diameter, lined with 8-in. brickwork—the last 27 yards enlarged to 20½ feet, diameter, 13-in. brickwork, 9 in. of which is fire-brick. The main return air is to be divided into three sections, and this is provided for by three dumb drifts coming into the shaft, the area of each of which is 9 ft. by 9 feet. Where two of them meet together before reaching the upcast-shaft the area is enlarged to 12 ft. by 18 ft.; each staple-shaft for each dumb drift is 10 ft. diameter. The place for the new furnace is the largest ever I had the pleasure to look at; it area is no less than 28 ft. long, 24 ft. wide, and 18 ft. high—its side walls 10 ft. thick. Such a thickness of wall I never heard of before. It is calculated that when the furnace gets fairly to work it will be able to raise 250,000 or a quarter of a million cubic feet of air per minute. This will, I think, exceed anything that has gone before it. They are putting down a new engine and boilers. The engine and boilers will occupy on area near to the furnace of 30 yards in length, 24 ft. wide, and 18 ft. high—the walls are 10 ft. thick. When Mr. Beacher first went to Lundhill the quantity of air passing through the workings was 85,374 cubic feet per minute; in 1867 he increased it to 88,3000 cubic feet per minute, in 1868 to 96,450, in 1869 to 109,320, and in 1870 to 120,678 cubic feet per minute.

There was one thing I noticed while looking through the workings. When visiting the stables, instead of wood mangers there were earthenware ones. This, though simple, is a good improvement. Wood, especially in a coal mine, is apt to rot, and taint or make the food go sour; but earthenware, if washed out, will not do so. So in nearly all the details of life we can and do learn to improve upon the past—for if we cast our eyes around us in search of the features which characterise our nature and the world we inhabit we shall distinguish among the most marked of these the principle of progressive improvement. We may say what we will of the good old times, and may rail, not without reason, at the degeneracy of modern days; still man's course is onward from darkness and ignorance to comparative intelligence and light. The partial and momentary checks which history records are but as the backward ripple in the advancing tide. The ocean of knowledge rises from year to year, from generation to generation, and its waters, unlike the waters of the earth, ebb not again. Experience—that undying teacher who can gather the pleasant fruit of wisdom even from the blighted tree of misfortune—is ever at hand to deduce from the faults and follies of the past hope and counsel for the future. Thus is man led forward, ever imperfect indeed, but ever improving—erring and sinning again and again, yet finding even in his sins and errors a monitor and a guide. G. ADCROFT.

Bentinck-street, Ashton-under-Lyne.

FORMATION OF THE EARTH, METALLIC DEPOSITS, &c.

SIR,—Under this title Mr. Harris-James, M.E., expresses in last week's *Mining Journal* the wish that the study of Geology (as he says, of late a very interesting science) should be divided into three distinct parts—Chemistry, Mineralogy, and Palæontology. I do not know how geology was taught in the school where the writer of the said article received his instruction, but I know that everywhere else, especially in the mining academies of Germany and Austria, a student of geology learns, besides the desired "branches" of geology, a great many other useful things; amongst them he receives a sound instruction in the principles of Physics, one of the most necessary accomplishments of every educated person. It is a pity that the greater part of Mr. Harris-James's article was lost; such must be the case, as in the paper, after a short list of old authors on geological matters, and a short list of chemical elements and their combinations, the writer comes to the somewhat startling conclusion that he "thinks" to have "in some measure shown that the earth was once an elastic mass of mineralised matter, and that by chemical affinity, and the influence of the atmosphere, &c., it by degrees formed the crust."

In the foregoing part of his letter there is no indication of any such demonstration of the sort, and I repeat it is a pity, as we would have no doubt received an explanation of the various and quite original scientific terms which he makes use of, as well as of the theory. As yet I must confess my utter ignorance in understanding the "only conclusion" at which Mr. Harris-James can arrive—that they (metalliferous veins) were formed by currents of electricity, metalliferous vapour, and water percolating (!) or passing through the chemical and electric mass of mineralised vapour. The currents of metalliferous vapour, and electric veins or vapour (!), passing through the chemical vapour of which the earth was created were filled with metallic gases (!) drawn from the adjoining strata of chemical vapour, and the metallic ores were deposited therein by electricity," &c.

It is useless to ask what the writer means by an electric mass, or an electric vapour or veins. So we do not at present know of any "metallic gas," under which expression is meant, I suppose, another of the "vapours." No doubt can remain that many "vapours" must have prevailed whilst such a theory was decocted.

C. L. GRIESBACH,
(Cor. Memb. of the K. K. Geol. Reichsanstalt, in Vienna.

ON THE DRESSING OF ORES—No. VI.

SIZING APPARATUS.—The separation of stuff into grains of a different size can be effected either by a combination of flat-bottomed sieves or by a set of revolving trommels. Flat sieves may be arranged for sizing purposes as a series of steps, fitted within a long inclined trough, or in a rectangular frame—they may be also rendered moveable or stationary. In the latter case, the stuff must be agitated and progressed across the plates by means of a tool or some suitable appliance. The angles at which moveable sieves are set is usually about 18°, the length of stroke 1¼ inch, and number of strokes per minute 200. The sizing effect can be produced either by a cam, shuttle, or crank motion; and any shock movement may be intensified by the use of wooden or steel springs. The nature of the classification made in some of the continental mines in connection with clearing trommels or kiln washing may be gathered from the following examples:—

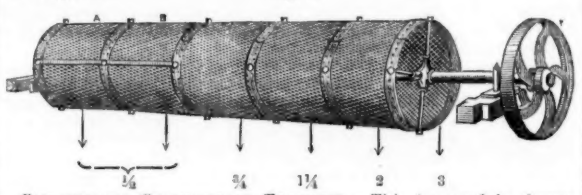
Immoveable sieves.... 32, 16, 4, 2, 1 millimetres.

Moveable ,, ... 32, 16, 11, 8, 6¼, 4, 2¾, 2, 1½, ¾ millimetres.

Rough stuff, from 16 to 32 millimetres, is hand picked; coarse-grained stuff and sand, 2 to 16 millimetres, jigged; and fine sand, 1-6th to 2 millimetres, jigged or treated on tables. The flat sieves have been extensively employed in Austria; but of late years the wash-works of Prussia and Belgium have been almost solely fitted with trommel-sieves. The disadvantages attending the use of flat sieves seem to lie in the amount of dead weight to be moved for securing a given result, the difficulty of classifying the finer divisions of stuff without the agency of water, and in the complication due to cam, lever, or crank arrangements; on the other hand, flat sieves are replaced with facility, and the sizing, proceeding from large to small grains, leaves the thinner and more finely-perforated plates free to do their work effectively.

Although trommel-sieves admit of simple arrangement in connection with the driving appliances, and present perfectly-balanced parts, yet none of the several forms can be said to be strictly free from objection; simplicity is sometimes secured by inverting the sequence in which the division of stuff is best performed, whilst, if the proper order of separating the grains from the greater to the less numbers is retained, it frequently happens that the apparatus occupy a considerable height of ground, or that the result is achieved by employing several concentric cylinders revolving on a common axis, which cylinders become difficult of access, when wanting some slight repair. In order to effect a thorough division of the grains by means of revolving trommels, water should freely enter into and fall upon the cylinder. The crushed stuff should, therefore, drop into a stream of water, and water should also be added to the outside of the trommel-sieve from a distributing launder or pipe. The names given to trommel-sieves accord with the work they perform—as, for example, clearing trommel, when depriving vein-stuff of clay and earthy matter; separating trommel, when dividing fine and coarse grained stuff for sizing trommels; sizing trommels when preparing stuff for jiggers and buddles; and draining trommels, when depriving sand of retained water. The prismatic and polygonal-shaped trommels are but seldom used, and hence will not be described. Cylindrical trommels require to be placed at angles varying from 3° to 5° in order to progress the stuff from the entering to the discharging end. The axis of a conical-shaped trommel may be strictly level, since the falling angle of the perforated shell, usually about 3°, combined with its rotative movement, will suffice to impel the stuff from the small to he large end.

Fig. 1.

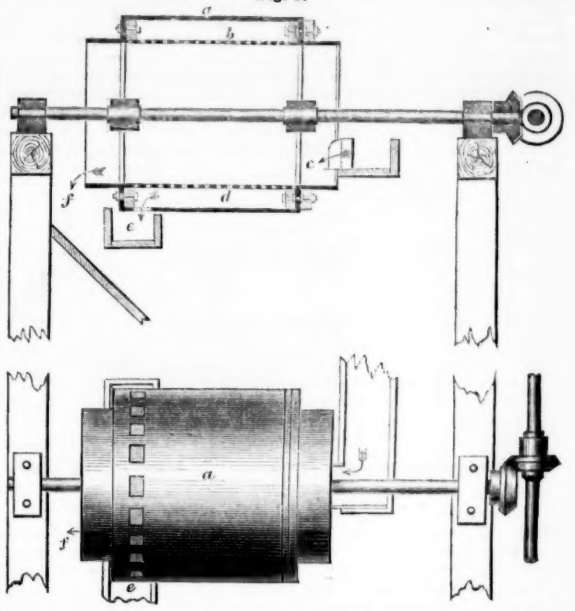


CONTINUOUS CYLINDRICAL TROMMEL.—This trommel is shown in Fig. 1. The stuff enters at the further end from the driving-rigger, passes to the ¼ millimetre section, A B, then successively over the ¾, 1¼, 2, and 3 millimetres divisions. The thin plates, A B, are supported by lateral bars fastened to the rings within and without the cylinder, one of such bars being shown. Wrought-iron rings, about 1½ in. wide, and ¼ in. thick, divide the cylinder into sections, and serve as fasteners for the plates and to connect the radial arms proceeding from the central bosses. The order in which the sizing is effected in this trommel-sieve is from small to large grains—consequently, the full quantity of stuff passes first over the thinnest plate, and, in the absence of careful feeding, will tend to overheap the fine holes, and to prevent a satisfactory classification; on the other hand, the separation being performed on a continuous line without a material loss of fall, this trommel is a useful one on many dressing-floors.

GENERAL REMARKS.—Angle of trommels, 3° to 5°; diameter of trommels, 2 to 3 ft.; number of revolutions per minute, 18 to 25; stuff sized per hour—viz., rough mine smalls, 100; coarse mine smalls, 60; coarse and fine sand, 25 to 30 cubic feet.

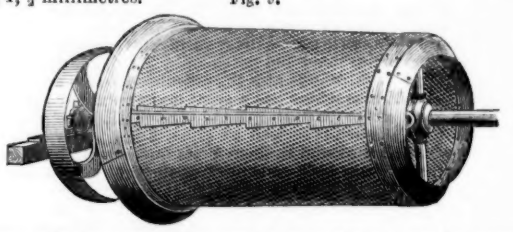
CONTINUOUS CONICAL TROMMEL.—This trommel is composed of different sizing divisions, as illustrated in Fig. 1, only instead of being a true cylinder the form of the perforated shell is that of a truncated cone, running from the axial line at an angle of from 3° to 4°. The sequence in which the sizing is effected is the same as in the continuous cylindrical trommel.

Fig. 2.



RITTINGER'S CYLINDRICAL TROMMEL.—This trommel-sieve, Fig. 2, is formed of an external sheet-iron cylinder (*a*), and trommel-sieve (*b*). The stuff enters at *c*, the finer portion passes through the perforated holes into the annular space *d*, thence into the launder (*e*), which conveys it to a second trommel-sieve. The stuff for the jiggers falls in the direction of the arrow at *f*, into a collecting-box, or hopper of a jigging-sieve. The shell (*a*) is 32 in. diameter, and 30 in. long; the trommel-sieve 24 in. diameter, and 42 in. long; the angle at which the trommel is set is 2½°; the number of revolutions per minute from 18 to 24. This trommel may form one of a series for sizing stuff flowing from clearing-trommels or crushing-rolls, the order of sizing being from large to small grains; the finest-holed plates only get a minimum quantity of stuff, and, therefore, will effect the division with freedom and accuracy. The following particulars are given of sizing-trommels in use at Ems, Prussia:—Trommels, each 20 in. diameter, 4 ft. long; angle of inclination, 1°; number of revolutions per minute, 18; number of cubic feet of stuff washed per hour, 45 to 50; water introduced with stuff, 30 gallons per minute; water required for nine distributing-pipes, 30 gallons per minute, or 3½ gallons per trommel; mine smalls sized into grains, 30, 20, 13, 8, 5, 3, 2, 1, ½ millimetres size; crusher-work sized into grains, 9, 5, 3, 2, 1, ½ millimetres size; stamps-work sized into grains, 3, 2, 1, ½ millimetres.

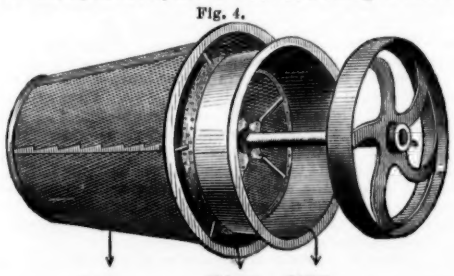
Fig. 3.



SINGLE CONICAL TROMMEL.—The trommel (Fig. 3) may form one of a set for sizing stuff from the clearing-trommel or crusher. The order in which the sizing occurs is from great to small grains—hence the thinnest plate and smallest holes are subjected to a minimum amount of wear. A system of six trommel-sieves, each 42 in. long, diameter at large end 21 in., and at small end 18 in., making 20 revolutions per minute, will size from 20 to 30 tons in 10 hours. The water required for washing the six trommels is from 12 to 15 gallons per minute. In order to convey the stuff from one trommel to another a sheet-iron or wooden hopper is employed, as shown in Fig. 6. When a set is fixed step-like, one above another, on a running angle of (say) 40° the driving-gear usually consists of a shaft and bevel-wheels; but the necessary motion may be communicated by a light side-rod and cranks, in connection with a small fly-wheel. At Angleur, in Belgium, where the stuff from the clearing-trommel is divided by seven trommels into fourteen sizes, each sizing-trommel is 20 in. diameter, and renders two divisions of stuff—viz., front division, 25, 20, 14, 10, 5, 3, 1 millimetres; back division, 60, 16, 12, 8, 4, 2, ½ millimetres. The length of the fore division is 16 in., and of the back part 2 ft., giving a total sizing length of 3 ft. 4 in. Some trommels designed by myself for sizing coarse-grained stuff and sand have a diameter of 24 in. at the small end, and 28 in. at the large end, with a sizing length of 38 in.; the number of revolutions per minute is 20. The sizing power of a group of 10 trommels, making 20 revolutions per minute, is about 8 tons per hour. The preference arising for cascade or step-like trommels is due to several features, among which may be noticed that the sizing takes place in the proper sequence of numbers—that is, from large to small grains. Each trommel usually excludes but one sort of grains and passes all grains smaller than the sieve holes through the latter, whereby a better separation is effected than with continuous trommels numbering several divisions. Large grains do not pass over fine hole sieves, and cause undue wear and tear. Each trommel is light, portable, and cheaply duplicated and replaced. Against these manifest advantages, however, must be placed multiplication of geared parts for driving a system of several trommels, and loss of fall arising from the descent of stuff from one trommel to another.

DOUBLE CONICAL TROMMEL.—For the purpose of obtaining three distinct separations of stuff in a short length, and without incurring much loss of fall, a double conical or concentric trommel is employed. Its use is, however, not so much as a sizing as that of a separating or dividing trommel. Fig. 4 exhibits a trommel of this class, the arrows and figures being introduced for the purpose of conveying an idea of the order in which the sizing is effected. In principle it is the same as the single conical trommel, the division taking place from large to small grains.

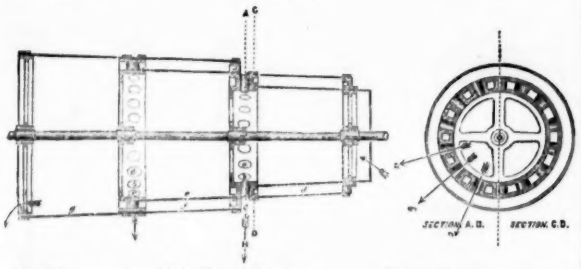
Fig. 4.



CONTINUOUS CONICAL TROMMEL.—With the view also of obviating

the great fall incident to single-sizing trommels, saving gear, lessen-friction, and securing the proper order in which the sizing operation is best performed, continuous concentric trommels have been designed by Rittinger, Huet and Geyler, and others. The construction of this apparatus will be readily understood by referring to Fig. 5, taken from Rittinger's great work on "Dressing," published in the year 1867. The crushed stuff enters at the small opening, and is carried forwards in obedience to the falling angle of the shell and the rotative movement. The first separation takes place in the trommel-sieve *a*, the resulting stuff being discharged through the openings *b* and *c*. The sand finer than the holes passes into the annular space *d*, and travels to the enlarged trommel-sieve *e*. Practically, the trommel is composed of three conical-shaped sizing-sieves, giving rise to four divisions of stuff, and two concentric shells, for passing the sand forward. By fixing the shaft, making it hollow, and perforating it with holes, water may be readily distributed upon the interior surface of the trommel-sieves; in this case the latter must be rotated on the shaft.

Fig. 5.



2, *Coleman-street-buidings, London.* JOHN DARLINGTON.

ORE DRESSING—No. VI.

SIR,—The second machine for dry concentration is that known as the "Krom's Separator," This is, in fact, neither more nor less than an air-jig. The ore, either fine or coarse, is spread over a sieve, and subjected to puffs of air from a bellows placed beneath, just in the same manner as water is forced through in the ordinary hydraulic jigs. The apparatus consists of a long horizontal ore bed, about 4 ft. 6 in. by 20 in. wide, made of wire-gauze tubes, placed longitudinally about a quarter to half an inch apart, according to the size of the stuff to be treated. The bellows are placed under this bed, and are set in motion by a trip-wheel and spring. The machine is also fitted with a receiver or hopper to hold the crushed ore, on which is fixed a gate to regulate the feed. The discharge is regulated by a very ingenious contrivance of a roller, set in motion by a ratchet-wheel and pawl. The machine is calculated to give from 300 to 400 puffs per minute. It is claimed that this tubular screen-bed is an essential phase in the apparatus, as the richer ores settle down in the grooves formed between the tubes, and then go forward towards a receiver, where they are allowed to actumulate to a given height so as to keep the beds filled for the fresh ore to work upon. The final discharge is regulated by the above-mentioned roller. This machine, it is claimed, will separate almost any minerals, however slight the difference of their specific gravities, and certainly in most experimental trials it has proved a success as far as the actual concentration goes. In practice, however, I am afraid it must be considered more or less as a failure, owing to the extreme slowness of its work. Most of the mines where it has been at work have abandoned it chiefly from this cause. It is a well got up machine, and comparatively light and compact, and would, doubtless, become a great help to mining in tropical countries if it could only be made to get through more work than it can at present.

HOOPER'S CONCENTRATOR.—This concentrator may also be called an air-jig. It was invented and patented by Mr. W. Hooper, of Ticonderoga, New York, who is also the patentee of some other dressing machines. This machine has a great many points of semblance with the Krom's separator in its general construction, though differing in details. The bed is formed of either finely perforated brass plates, or of wire-gauze, and is about 4 feet long and 12 inches wide, slightly inclining from both ends towards the centre. The puffs of air are procured by a diaphragm of vulcanised rubber, which is stretched out under the screen, and fitted with the necessary clap-valves. In the first machine this rubber bellows was set in motion by a cam-wheel and spring, but that has since been replaced by an eccentric, which makes a great improvement, especially in avoiding the great amount of wear and tear, which is unavoidable where a cam motion is used. The speed at which these machines should be driven varies, according to the quality and size of the ore, from 300 to 500 revolutions per minute. The discharge both of ore and tailings takes place in the centre of the bed, though on opposite sides. On the one side there are two discharges, one near the screen, for the heaviest and cleanest ore, and another about 1½ in. above it, for a second-class ore, which can be re-jigged. The discharge for the tailings is exactly opposite, though situated about 1½ in. higher than the upper discharge on the other side. The ore is fed in from hoppers at each end, and is carried by the puffs of air down towards the centre. This machine works better than the former one, as far as the amount of stuff put through is concerned, but I do not think it surpasses it in the completeness of its work. Both these machines have one great common fault, which almost precludes their adaptation in mines where the ores are of any great value—this is the enormous loss incurred by the blowing away of the very fine dust, and which is unavoidable as the machines are at present constructed. This fine dust is not only excessively injurious to the health of the workmen, especially where lead ores are being treated, but it also contains, as a general rule, some of the very purest and richest of the products of the mine, and ought, therefore, not to be lost. I lately examined some of this dust, which had been deposited round the machine, while experimenting on some silver-lead ores, and I found that it contained, on an average, about 25 ozs. of silver per ton *more* than the concentrated ore itself. This may be accounted for in two ways—First, that the galena being more friable than its surrounding gangue, portions of it had been ground to an impalpable dust before the whole mass had been reduced to the required size; second, the fact may be attributed to this cause—that in most cases of silver-lead ores a large portion of the silver is not chemically combined with the lead, but is present in the form of very small crystals, either of grey sulphuret or of fallow ore. These very minute particles become detached in the crushing, and are afterwards carried away by the currents of air.

UNION ORE CONCENTRATOR.—The fourth dry concentrator is the invention of a Mr. Jacobs, of this city. This machine is still too much in its infancy to be able to say much about it. It seems to be really a machine somewhat similar to the former ones, but wherein the inventor claims to collect and save all the fine dusts and slimes by the use of a system of fans and settling-boxes. One novel feature in this apparatus is that the screening surface, instead of being of perforated plate or wire-gauze, is formed of some coarse cotton texture, by which the inventor claims to obtain a more even and uninterrupted current of air through his charge. I am afraid that in practice this will, however, prove very troublesome, on account of the necessity there will be of constantly renewing it. The experimental trials of this machine have proved very successful, though whether it will hold its own in practical use remains still to be seen. These are, I believe, the only dry concentrators that have ever been used to any extent, and none of these have yet succeeded in displacing water concentrators, even in mines where the amount of water for the dressing-floors was extremely limited.

WATER SYSTEM.—This is the system most universally in use at the present time. All machines used in this system may, as I mentioned in my last paper, be classed under two heads, according to whether an intermittent motion or one of a steady and continuous sort be given to the water. Of the former class of machines there are two kinds—the one adapted for coarse ores and sands, and the other only to be used for fine slimes. The former are known exclusively under the head of jigs (German, Setzmaschinen), and the latter as shaking-tables (German, Stassherde).

JIGGING-MACHINES.—There are a very great number of machines which come under this heading, but they may all be divided into two principal systems—the English system, in which the stuff to be concentrated is jigged on or over the screen, and the Hartz system, in which the ore is jigged through the screen. There is, however, also a system known under the name of the New Hartz jigs, which is nothing more than a combination of these two former systems. The English system was, I believe, the first in use, and consisted at first simply of a round sieve, about 20 to 24 in. diameter, and provided with two handles, by which the miner could hold it to shake it up and down in a tub of water. The charge generally consisted of about 30 lbs. of stuff, previously reduced to a pretty uniform size. This the miner shook up and down in the water for about five minutes; it was then withdrawn, and a portion scraped off the top, which was thrown away as tailings; then generally a second layer was scraped off to be re-worked, and the remainder was considered as finished ore. In this way one man could get through from 12 to 14 cwts. of ore per day.—*New York, May* 3. E. G. SPILSBURY.

GOLD IN SOUTH AFRICA.

SIR,—In the Supplement to last week's Journal appears a long letter, signed C. L. Griesbach, "On the Occurrence of Gold in South Africa." Many of the statements in that letter are so erroneous and misleading that I trust you will permit me, in consideration of the interests involved, to correct a few of them.

Mr. Griesbach intimates in his first paragragh that he "as geologist" accompanied one of the expeditions consequent on Mr. Mauch's discovery of the Matabele gold fields. "Our object was to reach the gold fields by a shorter route in a small steamboat along the Zambezi River. . . . What observations I made whilst engaged in this pursuit are briefly as follows." The assumption here involved of a personal and local knowledge of the localities regarding which he writes is somewhat impaired by the admission in the final paragraph—"We found it impossible to carry out the project." But it is clear to me, from my own experience, as it must be to Mr. Baines, and all acquainted with the locality, that Mr. Griesbach is not only ignorant as to the later discoveries at the Tati, but that he could never have even visited the region regarding which his random assertions are made—*i.e.*, the southern and northern gold fields.

Mr. Griesbach reviews the whole country between the Cape of Good Hope and the mouths of the Zambezi, a distance in round numbers of 1500 miles. I shall confine myself to that portion of the country I explored in person, with the assistance of scientific and practical miners who accompanied me, and which consisted of a large portion of the country lying between the Vaal river and the Zambezi.

The southern gold fields, as far as the actual metal has been discovered, extends from north-west to south-east, a distance of 40 miles by 14 miles broad, about the centre of which is the Tati settlement, on the river of the same name, in latitude 21·27° south, longitude (approximate) 27·40° east. There are five different mines within a mile of the settlement—two 3 miles to the south-east, one 13 miles north, two 12 miles and 35 miles up the river to the north-west, and one 6 miles to the south-east of the settlement—making a total of eleven mines which have actually been worked, and gold extracted. In addition to these there are numerous other mines which have only been partially explored. From the before-mentioned eleven gold has actually been extracted.

In most of the mines two shafts have been sunk, to an average depth of 50 feet; one shaft in Blue Jacket Mine is 70 feet deep. The reefs consist of quartz, between walls of chloritic schist. The strike is from north-west to south-east, and the dip about 50° to the south-west. They vary from a few inches to 6 feet in width. There are two descriptions of quartz—one red and honeycombed, and containing much oxide, peroxide, and some white sulphides of iron; traces of sulphurets and carbonates of copper are also found. The gold is fine, and mostly found in the oxide and peroxide of iron; only now and then it is seen in the white quartz, without iron. The other kind of quartz is of a bluish grey appearance, without any iron, and of a finer texture; this quartz is found in Blue Jacket Mine, three miles to the eastward of the main Tati settlement, in a vein 6 feet wide. The gold in this quartz is coarser and more evenly disseminated than in the red ore. Two shafts have been sunk upon this vein, to the depth of 60 feet and 70 feet respectively, without meeting with either sulphides or oxides of iron. I have been down in this mine, and measured the thickness of the reef with my own hands; since I left the Tati it has averaged 6 feet, in some places reaching 8 feet. The following returns of crushing from this mine shows its value.

By advice from mining manager, dated Sept. 10, 1870, 19 tons 10 cwts. of quartz produced 31 ozs. 8 dwts. 3 grs. of gold. By advice dated Oct. 30, 1870, 19 tons produced 40 ozs. 5 dwts. of gold. From another mine 2½ tons of quartz produced 16 ozs. 10 dwts. of gold, and another parcel of 2½ tons produced 26 ozs. of gold. No douht these latter parcels were somewhat picked, yet if such selections amount to several tons it shows there is enough to pay a large profit. The mill in which this quartz was crushed was driven by Clayton and Shuttleworth's ordinary 10-horse power portable engine without difficulty, although not especially fitted for burning firewood. This quartz is very friable, and easily reduced in the mill. There is ample water for crushing purposes, although not sufficient to drive machinery; but the whole country is covered with timber of a suitable size for firewood, being about 50 ft. high, of a resinous nature, which is as good as coal for steam purposes, while large timber grows on the river banks which squares 4 ft., and is pronounced by good practical judges to be quite as good as teak for mechanical purposes. I have before me a letter from a practical mechanical engineer, who has lately come down from the Tati undertaking to crush the quartz, cart the same from the mine to the mill, cut and cart the firewood to the engine, retort the gold for a sum of 15s. per ton, and that with a small mill only capable of crushing 20 tons per week.

The climate is extremely healthy, and provisions very cheap, retail price of mutton being about 2d. per lb., and beef about 4d. The whole country to the north is full of herds of cattle, which the natives are only too willing to sell for about 3*l.* in goods, while the Dutch farmers bring up others from the Transvaal and dispose of them for about 5*l.* Goats are purchased from the surrounding natives for 5s. a head in goods. So far from the country not being adapted for the settlement of white men, a small colony of Dutch boers, with their herds, flocks, wives, and little ones, have established themselves 60 miles north of the Tati, at a place on the great trunk road called Mangwee. The Tetze fly is not within 50 or 60 miles of this part of the country. Although the distance from Durban to the Tati is 850 miles, yet transport is so easy that goods are conveyed the entire distance from the sea for 28*l.* per ton. From Potchefstroom, which is halfway between Durban and the Tati, there is a regular weekly post, and letters reach England in six weeks. The drawback at present is the want of regular postal communication between the Tati and Potchefstroom.

I will not trespass on your space so far as to describe the northern gold fields in this letter, but I may briefly say that these gold fields are about 350 miles further north, in latitude 18·11 S. I have also sunk shafts on them, and I have good reason to believe that they will prove as rich as those at the Tati. For the latitude of both the Tati and of the northern gold fields I have to thank my friend Mr. Thos. Baines, who obtained them from a great number of most accurately-taken observations.

If anyone interested in the future prosperity of South Africa will call at the office of the London and Limpopo Mining Company, 11, Leadenhall-street, E.C., I shall be happy to show them ingots of bullion from the Blue Jacket and other mines, together with samples of quartz weighing several hundredweights.

In this letter I have confined myself entirely to facts, leaving the theory of geographical formations, &c., to the Professors.

Army and Navy Club, London, May 18. JOHN SWINBURNE.

AMERICA—MINING TITLES.

SIR,—In the Journal of March 11 "A Broker" enquires which is the preferable title, first location or United States "patent" to mines. This is an important question, and will, no doubt, be answered long ere this reaches you. There is, however, the bare possibility that it may not be, and I proceed, therefore, to reply. The first location of mines conformable to local laws entitles to pre-emption. By local laws is meant mining district laws, which the exploring or prospecting miners frame for themselves on locating a district, and which the State and United States Government both recognise and respect.

The title to mines conveyed by the United States Government takes the form of all ordinary business transactions of sale and purchase. Its conveyance, or transfer, is in consideration of value received, which is legally pre-eminently valid and final, and constitutes fee-simple possession. The first location title includes a legal possessory right of ownership, inalienable to the locator or squatter, as part of a compact entered into with the United States Government, the fidelity of which, in this respect, is established by all precedent. This pre-emptory or possessory right of the squatter may be perfected at any time, at his own option, by supplementing it by that of the qualified landowner, the essence of which is payment to the Government, through the usual channel, of the amount fixed—$1·25, about 5s. per acre.—*Ellsworth, Nye county, Nevada, April* 19. ROBT. KNAPP.

P.S.—Since writing the above, the reply of "R." to "A Broker's" question has reached me, in the Supplement to the Journal of March 25. I cannot but regard that effort as more calculated to confuse and embarrass than to enlighted.—R. K.

HYDRAULIC OR WATER MINING IN AMERICA VERSUS QUARTZ MINING.

SIR,—Before I commence to write on this subject allow me to inform you that I am a native of the Southern States, and have but little or nothing to do with gold or silver mining in America; but whilst during my stay in Europe, and London in particular, I have learned that the public here have been induced to invest in several water mines in America, which I am sorry for, from the fact that no one will attempt to dispute that water mining in America cannot compare with the enormous success of quartz mining, The following article on Hydraulic Mining in the New York *Engineering and Mining Journal* speaks for itself; it points out that the principal mines in this district (The Little York) may be good, but at the same time notices the fact that 19 water mines out of 20 in this district have been abandoned during the past five years:—

"In July, 1867, there were between Quaker Hill and Little York 19 mills, with 164 stamps, erected at an aggregate cost of $100,000, for crushing cement, of which 80 stamps were then running regularly. In October, 1870, but one of these mills, that of Goodspeed and Co., at Hunt's Hill, was running regularly, and two or three others at intervals. Hydraulic operations are also suspended at all these points, except Little York, on account of the scarcity of water this season, which has been remarkable for its dryness, but it is probable that next year this branch of mining will be more extensively engaged in at points where outlet is practicable than for many years past. The owners of the cement claims formerly worked by mills are fitting up hydraulic apparatus for washing off the dirt down to the cemented gravel, and will not resume crushing until this top dirt is run off, when they can pursue this business free from the disadvantages and expenses of underground workings. The hydraulic dirt is rich enough to pay well at present rates of water (12½ c. per inch), with the improved machinery now in use, and it is an absolute certainty that the bottom will pay largely when it can be mined and crushed without the expenses incident to underground operations. Taking the aggregate results of channel mining, by means of tunnels and drifts, on this range, we should find that it has not been a profitable business, considering the amount of capital invested, although some of the claims near You Bet have at seasons yielded almost fabulous returns."

It is this article which induces me to address you, as I am more than anxious that good and safe American quartz mines should come on this market. I cannot consider it fair that water mines should hold the same standard of value as quartz mines; the thing is absurd, and no American would think of comparing the two ventures—one is 20 to 1 against, and the other is 3 to 1 on. If the public here like the odds I have, of course, nothing to say, but if they lose let them not blame Americans, but let the blame fall on the vendors and those English directors and others who place such properties on the same footing before the public.

I protest against it in the interest of America, and am endorsed in my view by an article in one of the first mining papers in New York. I am glad to find that the day of "wild cat" mining is passed in England, and that no vendor from America can sell a mine here unless he shows and guarantees a net annual dividend of 25 to 30 per cent. This is about as safe an investment as any speculator can make, because in nine cases out of ten such investments will prove satisfactory, as few mines fail after once they have proper machinery, and are brought to this point.

I find on enquiry that during the past year eight dividend-paying gold and silver mines in America have been placed on the English market, with the assurance that a dividend of not less than 25 to 30 per cent. would be paid to the shareholders. This result has been realised, and we find that if an investor had taken 1000*l.* worth of shares in each of the eight companies he would find himself twelve months afterwards in the fortunate position of being able to sell his 8000*l.* for half as much again, or 12,000*l.*, and he would have received a dividend of 25 per cent. from two companies, with a sure knowledge that five of the other companies are certain to pay (have now in hand) a like dividend. Only one of these eight companies has disappointed the shareholders, and it is still to be hoped that this stock will soon be at par, as it is thought that it is only a question of management and good engineering. American non-dividend paying mines cannot be placed on this market at almost any price, but quartz dividend-paying gold and silver American mines are fast gaining the confidence of the public, from the fact that when once a mine is brought to a dividend-daying state it seldom or ever fails. The history of mining shows that much time and capital has been lost in hunting for the *true vein* of the precious metal, but when once found it is rarely lost.

The financial public in England know but little or nothing of the vast mining interest in the United States, having been accustomed to look upon South America and Mexico as the only great gold and silver regions in the Western World; this may be accounted for by the fact that it is difficult to erase history, and history points out to Mexico and South America as regions of gold and silver; but history could not foretell what the vast empire of the United States would be doing in the nineteenth century in order to contribute to the precious metal currency of the world. Some idea may be formed as to what may be expected from America in the future, when we learn that one silver lode (Comstock, Nevada) has produced in ten years $100,000,000, or 21,000,000*l.* sterling in silver.* Each day every hour brings forth new discoveries and new mines; one announcement is followed by another, more wonderful than the last. American bankers value these discoveries, as is shown by the fact that a first-class New York banking house lately paid 300,000*l.* in gold for a mine that had recently been discovered, and had been but little worked. This may appear wild and strange business for bankers, but the fact remains, and may be relied upon; one of the first mining journals of New York has published the statement.

If American gold and silver mining be confined to dividend-paying properties, they may with all possible safety rely upon millions of capital being taken up in Europe. The experience of those who have gone into these matters is highly satisfactory, because in 12 months they have had fair interest on their capital invested, with an increase in value of 50 per cent. The gross capital already subscribed on the London market amounts to about 1,000,000*l.* sterling, so that the yearly dividends will amount to 250,000*l.* per annum. This may be gambling, but so is every investment on the Stock Exchange, and few go there who want 3½ or 4½ per cent. on their capital; those who go to that immense market go there expressly to realise from 10 to 20 per cent. on their investment, by purchasing Turkish and other doubtful Government securities, who cannot raise capital here except on these terms. I should like to point out to this class of investors how much safer American mining securities are, on the whole, than those of European nations; and, if they mean to gamble, let them go in for 25 per cent. in some American mines, and in nine cases out of ten they will be right.

The day has gone by when promoters and directors could represent what they liked about America; many financial men, brokers, and others, have visited that country during the past few years, and what they do not know personally can always be ascertained by investing a few pounds in a cable message. The gold and silver rules, as well as financial rules, which apply to Europe are all wrong as applied to America. Nothing seems to stop the Child of the West, she is bounded on the north by ice and snow, and on the south by sunny tropics; her mighty inland mineral wealth is fast pressing on agricultural figures, and it is a question whether the combined wealth of the mineral interest in America does not equal her agricultural statistics,

* The Government returns for 1870 gives 12,500,000*l.*

and the world in ten years hence will be as much astonished at the mineral wealth of this great empire as those are to-day who look back upon the value of the American National Debt at its issue price and its present value. This may be some news for many in Europe who know of America as a cotton and grain growing country only. Her financial strides during the past ten years have been truly great, and her future career must exceed the former decade 100 per cent., and in no branch of her wealth will so much progress be made as in mining, because the completion of the Union Pacific Railway across the country has opened up a new world; and now that three other such lines, 2000 miles each, are building, who will dare prognosticate the future? My pen falters, although an American I cannot; I must, however, before closing, remark that the States which will mostly benefit by the railways will be Utah, Montana, Arizona, and Idaho. Each of these States are larger than Ireland, but owing to their isolated position (before the opening of the new railways) they have not had a fair share of capital, and but a little public notice, and but a few years since were occupied by the Indians; to-day, however, they are making rapid strides, commercially and financially, and yielding incredible amounts of gold and silver which were completely undeveloped, and which the most sanguine human foresight could not have anticipated. A SOUTHERN.

P.S.—The following are the closing Editor's remarks of the *Economist*, which so far endorse the above that I ask you to copy them:—"America is sending us now bullion to an extent which she has not nearly equalled since 1862. Of course, this is the natural course of events. America is a great gold-mining country, and she ought also to be a great gold exporting country. For some years the peculiar course of events, both during and after the civil war, interfered with this, but now the trade is returning to its common channel. There is also an increase in the gold imports from other countries. And this increase in the receipt of gold from America and elsewhere is one main cause of the accumulation of bullion in the Bank of England, and of the consequent reduction in the value of money in Lombard-street."

IRISH INDUSTRY, AND THE FUEL SUPPLY.

SIR,—I was surprised to learn from the article in last week's *Mining Journal* that the Killenaule culm could be purchased at so low a price as 7s. 6d. per ton, for at that price I cannot comprehend what difficulty there would be in utilising an unlimited quantity, to form a block fuel in combination with peat. If the Southern Railway of Ireland can only succeed in enabling an abundant supply of cheap fuel to be placed at the disposal of manufacturers, there are many places in Ireland that would gradually rise to as important centres of industry as Manchester itself. The Irish textile manufactures are acknowledged by the ladies of all countries to be excellent, and if we had but fuel as cheap as it is around the manufacturing places of England, I would venture to predict that the linens and poplins of Ireland would compete in the English market with any of the light cotton and worsted goods, or any of the foreign silks, at present brought into it. But we must have fuel cheap and English capital abundant, and I look forward to the time, and believe it is not far distant, when both will be obtainable.

The great difficulty which has always been experienced in burning peat has arisen from the large quantity of water which it contains, but from experiments made in America the admixture of coal with the peat seems to render the presence of the water comparatively unimportant. The coal dust and crude peat may, by the use of a very simple apparatus, be mixed in given proportions, and manufactured into blocks of convenient size and form, which are dense and cohesive, and may be dry and hard enough for use within a very few days after passing from the mill, though, as in the case of the pure manufactured peat, it improves if housed for a season. The cost of manufacturing the fuel after the materials are at the mill need not exceed 2s. 6d. per ton. A very important discovery in relation to this matter is the fact that salt water or marine peats are equally valuable for this purpose as the inland peats, and some of the experiments made go far to prove that in some respects they are superior for this purpose; so that, in this simple fact, we have opened up an immense value to "marshes by the sea," which are almost without limit in extent, while, at the same time, they afford for this special purpose the material required, at the very point where the main item of cost (transportation of the coal dust) would be at its minimum, for vessels bringing it from point of shipment can discharge directly at the place of manufacture, on or by the side of these bogs.

The American experiments to which I have alluded were made on the Boston and Albany line. In one experiment the train consisted of eleven freight cars, three of them loaded, which is equal to fourteen empty cars—a heavy train for a grade of 83 feet to the mile. Started with 60 lbs. steam. Nine minutes after starting the steam had run up to 140, and they had to open the furnace door. Twice they pumped cold water into the boiler, once with both pumps, when the steam fell 10°—from 130 to 120, but in five minutes was up again to 130. Had they been burning wood, and used both pumps in the same manner as in this case, the steam would, it was calculated, have run down fully 60°. The engineer was astonished and delighted, said it was decidedly the best fuel for making steam he had ever used, and expressed the opinion that half a ton would take an ordinary passenger train from Chester to Pittsfield—24 miles, including the long and high grade before described; or that a ton of it would take a passenger train over a common grade road 100 miles, and that a tender would carry 4 tons of it.

It is certainly to be regretted that the experiments did not extend to a comparison of the mixed fuel with coal, but it was ascertained that the heat was clear, steady, and extremely intense; the combustion appeared almost perfect, there was no caking of the fuel, and it made but very little smoke. The mixed fuel will burn in almost any fire-box of either wood or coal burning engines, though if it were to come into common use we should doubtless have fire-boxes specially adapted for it, and a little experience would demonstrate the best and most economical method of using it. It is believed, moreover, that the method adopted for the manufacture of this mixed fuel may be adapted, by simple modifications, to the smelting of various kinds of ores; also to the desulphurising of ores in the most perfect manner. The ores and flux to be crushed and mixed with the peat in ascertained proportion, and the whole to be manufactured together in the form of fuel, with which the furnace is charged at pleasure. The results obtained from experiments on a small scale are such as seem to indicate that a very superior product of metal might be so obtained at comparatively small cost.

If Ireland could be supplied with such fuel as this at 10s. or 12s. per ton, and I am convinced in many districts it could be supplied at those prices, Ireland might become as important an industrial country as could be wished; you would hear no more of Irish discontent, and happiness and prosperity would take the places now occupied by misery and poverty. The extension of railways would naturally have an important effect, and the free construction of colliery branches wherever coal fields exist would be still more important, but if railway companies would advance their own interest, and that of the districts served by their lines, they should be careful to make their tariff for the transport of minerals as liberal as possible.

Fermoy, May 16. MINER.

DEVON GREAT CONSOLS—THE RECENT MEETING.

SIR,—While appreciating the *suaviter in modo* of our board of directors, who commendably sought to act consonantly with the wishes of an unimportant minority of the shareholders, each of whom would appear to have only very recently acquired his interest, I, as an old and large shareholder, must protest against our well-intentioned directors again acceding to such flimsy, but I apprehend not altogether disinterested, requests. In the first place, the requisition was not signed by a sufficient number of shareholders to legally convene an extraordinary general meeting; and in the next place, the proposed alterations struck so radically at the very basis of the constitution of the company, that not a single shareholder who desired to promote its real and permanent interests, and had no private or personal end to serve, could be found in the ranks of the dissentients.

As a silent spectator at the meeting, I could not but note the magnanimity with which the initiators of the movement expressed their willingness to withdraw the propositions when they saw they had not the most remote chance of being supported even by a respectable minority—it strikingly reminded one of an utterly vanquished foe, when the last gleam of hope had passed away, assuming a momentary courage just sufficiently consistent to enable him to say that he would retire. This section of the Plymouth brethren appeared altogether incapable of accepting the fact that "discretion is the better part of valour," as their show of impotent courage was equalled only by their infatuated indiscretion, which appeared to beset them until hopeless defeat suggested magnanimity.

The satisfactory features to *bona fide* shareholders, however, were that the mines have improved and the reserves increased; and upon the authority of our managing director at least the present rate of dividend will be maintained until copper shall have advanced in value, which will, of course, proportionately increase our profits and dividends.—*May* 16. ONE PRESENT AT THE MEETING.

THE DEVON GREAT CONSOLS.

SIR,—The report of the recent annual meeting of this company, and the movement on the part of the local shareholders, brings very forcibly to mind the remarkable fact that at the time of the formation of the company by Mr. Josiah Hitchins, some quarter of a century ago, not a single share was taken in the whole of the neighbourhood in which the mine is located, and operations were started by the present Chairman, the present resident director, and a limited number of their friends and relatives, who undertook among themselves the sole responsibility of the enterprise.

Some years after the prosperity of the mines had been established (about the year 1848, if my memory serves me rightly), owing to a panic, which proved only of short duration, shares fell down to and below 200*l.* per share, when a certain few were purchased in the vicinity, and the purchasers of those shares have ever since been reaping a constant golden harvest, with many opportunities if they felt so disposed in the meantime of making upwards of 500*l.* per share.

In view of this evidence, and of the fact that the mines have paid the enormous sum of nearly 1,200,000*l.* in dividends under the present directory, the attempt to shelve the venerable secretary, and to remove at one fell swoop the direction of these great concerns from the present London establishment, and to subject the management to the caprice of a local committee certainly does seem (from whatever fertile brain it may have sprung) an excessively grotesque idea.

May 16. FIAT JUSTITIA.

MINING IN SHROPSHIRE.

SIR,—In my last communication to you, which was published in the Supplement to the Journal of April 22, I left off at Tankerville Mine. The next sett—or, I might say, setts, for I hear of the Stiperstones Mining Company (Limited) having introduced fresh blood into the concern, have divided the PENNERLEY from the BOG, which according to the opinion of parties conversant with the district should be done, there being plenty of ground for two large mines, presuming it will take some time to properly develope them; but no doubt with energy, coupled with what they have, good management, these mines will be permanently productive and profitable.

Adjoining the Bog is a sett called KINNERTON, which is of great promise, as several well-defined and large lodes have been opened on at surface, containing sulphate of barytes, copper, and a sooty kind of stuff, which the miners in the neighbourhood inform me is associated more or less with lead ore, and is the body it lives in, and is found near the surface. Although this sett has been neglected, the time will come when the attention of the public will be drawn towards this very large mineral property, as well as to others that seemed to be dormant for some time; but it is said now and again that all the good mines are not to be found in the same year or even in the same age: but of this extensive mineral property it might be said that any person going on the ground will be at once struck with the numerous lodes running through it, and the advantages which cannot be over estimated, as tending to the cheap and quick development of the property is the facility that exists for driving adit levels on the course of the lodes. The other mines in this range having been proved to be very productive, no doubt, from present appearances, Kinnerton will be found to become one of the most productive mines with, perhaps, smaller outlay than some of the others. The Kinnerton Mine, I hear, will be brought out soon.

Next on the Stiperstone range, and joining this and Old Bog Mine, is LEEDS ROCK HOUSE. This appears to be entirely neglected by the public, but there is every reason to expect it to become a good mine, having within its limits all the elements of success.

I am glad to find a company is formed for the Ritten Castle, now called WEST STIPERSTONES. From its being situated close to Bog, Leeds Rock House, and South Gravels, it bids fair with proper development to turn out a good mine, and with the present company and management prove an undertaking of great value. This property has been highly spoken of by the miners in the neighbourhood. Passing over through Shelve we come to the GRIT and LADYWELL, the Old Grit being stopped for the present, and operations being carried on chiefly at Ladywell, where there is every prospect of having a good mine. If the shareholders will only exercise a little patience, and properly lay open the many lodes in their property, they will be crowned with success. We do not hear much about this mine, as the company are quietly working the concern, and we see no reports of their doings; the shares, I am informed, are 100*l.*, and well held. Close to, on the other side of the Bishop's Castle road, is the MIDDLETON and STAPELEY sett, of from 700 to 800 acres. Some years since this property was eagerly sought after by parties in the locality, but could not be obtained until the present proprietors came into possession, who granted it to Messrs. John Taylor and Co., who did but very little in it, most of their capital being spent in the Old Grit Mine, and, after selling some hundreds of tons of lead, the capital being exhausted, they abandoned all the mines they had here. From Middleton and Stapeley many years since some 400 tons of lead ore were raised, and drawn through the Old Grit shaft. Most, if not all, the lead-producing lodes of the Grit and Ladywell pass into this sett. Some of them have been opened on the surface by trenching. Messrs. Taylor and Co. drove a day level on the course of a lode, which at that depth produced carbonate of lime, blende, and lead ore in small quantities. This sett is well situated, having the Grit and Ladywell on the south-east, Rovington Mine (now about to be resumed by an influential company) on the north-west, and not far distant to the east is the Roman Gravels, West Tankerville, and North Tankerville. This sett is held by a small party, and, from what I hear, will be brought out soon, and I wish them success. Some intimation has been made of amalgamating this with the Old Grit and Ladywell, but this I cannot vouch for.

A few yards now brings us to the GRAVELS. This, like Tankerville and Snailbeach, will speak for itself. From the large reserves I wonder the shares do not go much higher than they are now. In a line with, and adjoining to, is the Old Wood Mine, now called WEST TANKERVILLE. Some of the lodes of Gravels run into this sett, and I heard from some of the men that a great many tons of lead ore had been raised some years since from (Bat Holes) West Tankerville by the Old White Grit Company, and drawn through the Gravels shaft. There is no fear of this being a success with so many lodes in the property, and all of them producing lead ore and blende, as can be seen by the stuff now at surface awaiting the laying out of the floors and getting the crusher in order, which will soon be done, and the drawing-engines put to work, when a large quantity of stuff will be drawn from the different workings on Wood and Cornish lodes north, and on Boundary shaft south, where there is a mine of itself. In addition to this there is the Hope Valley portion of the mine. This valuable piece of ground is but very imperfectly tried, and only requires capital to properly develope it, there being several lead-bearing lodes in the sett, and no very great trials made on them. This portion is a mine of itself without Old Bat Holes. Joining this to the east is NORTH TANKERVILLE, one of the most promising pieces of ground in the district, having been worked for barytes from 20 to 30 years since by the late Mr. W. Jones, and many tons of first quality lead ore was sold therefrom. Since then a large quantity of barytes has been raised, and lead ore sold from shallow workings from surface. This lode shows the same at surface as Old Snailbeach, the properties being the same (sulphate of barytes) as might be seen at Lord's Hill. The lode in North Tankerville having the same bearing and underlay south, and in a line with Snailbeach lode, it will not be out of place to say it is Snailbeach lode. The sett is large, and has many lodes in it. All parties look for something first-class here. I was informed that in taking out ground for the engine and boiler house lumps of lead ore had been met with, and are to be seen at the mine, from 1 to 3 cwts. I am glad this conce is now being worked with energy by steam-power. When the shaft is down to the depth of adit and communicated therewith the men in the neighbourhood say they can get lead ore at once.

I think it now time to close this long epistle, but before doing so might yet make a few remarks on the different mines named in this and my last letter. OLD SNAILSBEACH MINE stands first, and is rich. NEW CENTRAL, a comparatively new concern, and with the Mytton Dingle portion of the sett will do well when it is properly laid open. PERKINS BEACH is still every day improving, and will make a great mine. TANKERVILLE is rich, and will be for years to come. PENNERLEY and BOG are two great mines here. KINNERTON is new, with some seven to eight lodes from Bog and Rock House Mines running into it. This piece of new ground, containing about 1000 acres, highly deserves a fair trial. RITTON CASTLE (West Stiperstones) requires a little more time to develope it. SOUTH GRAVELS is a good undertaking, well situated. GRIT AND LADYWELL, although worked at Grit for many years, I presume in the time of the Romans, is but in its infancy. MIDDLETON AND STAPELEY is a large promising sett, and well worthy the attention of capitalists. Sir R. I. Murchison, in his "Geological and Mineral Survey through the Shropshire District," said that the lands abutting the Cornden Hill to the north-east would be found to contain the largest deposits of mineral in the district, and other mining authorities have pronounced its undoubted value. There is a large tract of country to the west of Middleton and Stapeley, now in the hands of the CLIFF DALE BARYTES COMPANY. The grant contains many large lodes of lead ore in all of them, and of the most promising description. This company (Cliff Dale) has been working on one of the lodes for barytes for some years, which they grind at their mills on the road leading from the mine to Minsterley. ROMAN GRAVELS needs no remarks—see agent's reports in the *Mining Journal;* WEST TANKERVILLE the same; and NORTH TANKERVILLE will speak for itself shortly.

I might be asked how it is that all these mines laid idle for so many years, being so promising as they are? This question can be readily answered:—The companies holding mining setts had most if not all the lands belonging to one landlord in this district, comprising some thousands of acres, and containing several sections or mines well worthy the outlay of capital; but, as the parties then working the mines only made small trials, nothing important was discovered, and the mine or section abandoned, and another portion of the grant commenced for a short time. This can be proved by Tankerville and Roman Gravels. If these mines had been vigorously worked by the old companies the present company would not in all probability have had the mines they have. Success to the whole of them.

Pontesbury, May 15. H. J. BADDELEY.

DRAKE WALLS MINE, AND ITS MANAGEMENT.

SIR,—Noticing a few remarks published in the Journal of May 6 respecting the system adopted in working this mine, or a series of tin veins, those remarks being a few extracts from Capt. Thomas's report, may I ask the favour of your inserting the enclosed report, made by the late Capt. Charles Thomas, of Dolcoath, who on several occasions inspected this mine for the committee of management, and whose suggestions and advice have received our most careful attention. I may add we are at all times anxious to adopt the most approved mode of working such peculiar series of tin veins, either by tribute or otherwise, for the full benefit of the company.

THOS. GREGORY.

SIR,—As requested by you I, on the 28th ultimo, inspected this mine, and on the evening of the 29th carefully analysed the cost of working the several departments, both underground and at surface. The follwing is my report in the order of the questions you sent me:—

Question 1.—Whether by the present system of stoping the lodes we are, in your opinion, pursuing the proper course?

Answer.—In the stopes over the 40 I find about 20 small branches, containing tin, extending over a width of 16 ft., the whole of these branches producing, I judge, about 3 cwts. of tin ore, of the value of 10*l.* 10s. to a fathom in length, and a fathom in height of the lode or branches; worked by 12 men. In the back of the 60 the number of branches is much less, and not at all richer than those at the 40. I think the lode at the 60 fm. level stopes is not worth more than 5*l.* per fathom; worked by 12 men, and 6 men rising by way of discoveries. At the 70 fm. level stopes, worked by 20 men, the number of branches is about the same as at the 60, but richer probably, worth together 12*l.* per fm. Over the 80 the stopes are producing 2½ cwts. of tin, worth about 9*l.* from about half a dozen branches in a width of 8 or 9 ft. The stopes over the 92, over a width of 7 feet, containing about four branches, are producing, I think, about 3 cwts. of tin, at 10*l.* 10s. per fm. This description shows that the branches are less in number, and those within a narrower compass at the 92 are not of less value than those at the 60. The value of all the stopes is, however, frequently changing, no two weeks being alike; from these facts I infer that stoping on an extended scale, either by tutwork or tribute, is the only mode of working to propose practically. I prefer the latter, tribute, if the men can be induced to work steadily, and that in most if not all the stopes, but I fear but few of the men now in the mine working, as they have been for the most part on tutwork, could be brought to work on tribute, excepting at the 80 or 90, where the tin is more concentrated.

Question 2.—Whether it can be ascertained by taking samples of the lode at proper intervals that certain points will pay to stope while others will not?

Answer.—As stated above, the value of the stopes is often changing, and that no better estimate can be formed of the general value than that of the judgment of a competent miner viewing the stopes frequently, as your agents do; except, indeed, by crushing and dressing the produce of each stope separately, which would be inconvenient and very expensive. The taking of samples in the ordinary way from the large quantity of stuff now drawn to surface could not be relied on for ascertaining very accurately the value. If samples be taken it must be done by crushing at least a ton for taking a sample from. If the mine were worked throughout on tribute by competent miners, probably a portion of the waste could be left underground, and samples taken with more confidence.

Question 3.—The value of the ground at the 92 and the shaft at the 100?

Answer.—The lode in the stopes at the 92 are worth on an average, I think, as stated in Answer 1, about 10*l.* 10s. per fm., and in the end at present about 9*l.* for three branches, or within the width of 7 ft. The bottom of the level a little behind the end, so far as I could examine it, seems to be of somewhat more value than the end or stopes. The lode in the shaft from the 92 to the 102 is not of much value, nor do I think the 102 will improve much for at least the next 12 fms. in drivage, judging from the value of the 92 for that distance.

Question 4.—Whether the best mode is adopted for spalling and selecting at surface?—Answer: I cannot suggest a better mode for this peculiar sort of tinny stuff—small branches and strings of tin running through and clinging to a large portion of the stones.

Question 5.—Whether there is any better and cheaper mode, in your opinion, to be adopted in the dressing of the tin ores from the crusher to the burning-house?

Answer.—If some suitable instrument or apparatus could be made to be worked by machinery for stirring the crushed stuff in the strips now stirred by boys, some moderate saving could be effected. I directed the dressers' and the agents' attention to this; they replied that some attempts had been made without success, but they thought the matter worthy of another trial. In other respects I have not any suggestion to offer.

Note 1.—From the cost-book and best information at command I collect the following expenses of preparing for the market the produce of each fathom of lode in an average of the stopes:—Stoping, including drawing to surface, 3*l.* 5s.; wear and tear of shafts, ropes, carriages, chains, and kibbles (say), about 5s.; dressing 2½ cwts. tin ore, including all surface work, wear and tear of crusher rolls, riddles, shovels, barrows, engine men, labour, coals, &c., 2*l.* 10s.; value of 2½ cwts. of black tin, at 70*l.* per ton, 9*l.*; total cost of raising and dressing tin from the stopes, 6*l.* for 9*l.* worth of tin, or 13s. 4d. in 1*l.* The cost of timber, which is not uniform, nor the extra cost of driving levels and sinking shafts for exploration, are not included in the above.

Note 2.—Cost of dressing per ton of black tin:—Crushing, including coals, oil, grease, engine men's labour, and wear and tear of rolls, 3*l.* 15s.; tramming and wheeling over the burrows to crusher and stamps, and carriage of tin to market, 3*l.* 10s.; spalling, 3*l.*; sundry attendance, washing, shaking roughs, &c., 18s.; labour cost, dressing tin, 6*l.* 10s.; wear and tear of barrows, shovels, &c., carpentry and smiths' work (say) 1*l.*=18*l.* 13s.—say, add for changing and repairs of dressing apparatus and machinery, 1*l.* 7s.: total cost of dressing per ton, about 20*l.*—N.B. The tinstuff when prepared for crushing and stamping contains about 1 per cent. of black tin, requiring 100 tons to make one of tin for the market; the cost of spalling and dressing a ton of tinstuff is, therefore, about 4s.; the cost of drawing, including wear and tear, is nearly 1s. a ton.

From the above notes, giving a near approximate to the value of the stuff raised, and of the actual cost of raising, drawing, and dressing, it must be manifest that great economy must be exercised in every department to enable the agents to meet the cost of the mine, even at the present good price of tin. You are aware that a large portion of the loss during the past year has been occasioned by the repairs of the engine-shaft, which was only saved from ruin by great efforts on the part of the captains, and by the driving of the 70 to the north lode, a distance of nearly 70 fms. Moreover, the price of tin during the last year, on the whole, has not been very good; these extra costs have now come to an end, and the prices of tin are good. There is also a good stock of tinstuff underground, which can be drawn and dressed in the coming winter when water power is available; no loss, therefore, for the next six months, I think, will be sustained. The present working lode can be worked at somewhat less cost if a shaft be sunk from surface eastward near to the end of the 60; it might be sunk on the course of the lode, proving the value of it all the depth, which will only be about 30 fms. from surface to the rise over the 60. By this the ventilation of the eastern part of the mine would be greatly improved, and a long line cut off from the underground tramming. I recommend that the shaft be sunk in the course of the coming summer, to be sunk large enough for an engine-shaft, as the dip of tin seems to be eastward. The north lode is explored at the 70 about 10 fms. west of the cross-cut; it is generally about 2 ft. wide, of some value for tin, and throughout the last 3 fms. driving has produced a little good yellow copper ore. The lode in the end approaching a cross-course has a promising appearance for copper and tin; the geological position of this lode further west and deeper is favourable for copper. The granite, which is copper-bearing in Hingston Mine, cannot be far away in that direction; the best plan for working

this lode more extensively is, I think, by driving a cross-cut to it at the 90 further west than the 70 cross-cut. I cannot recommend the drivage of the adit level, which is wholly in killas too shallow to expect ore.

In conclusion, I beg to say that I think the agents on the mine are worthy of your full confidence. The underground bargains are set by contract on the most approved principles, and the surface working departments are carried on in a satisfactory manner. Moreover, the agents manifest a lively interest in the welfare of the mine, and are anxious to have any suggestion tending to give a chance of improvement in any department. The principal questions to engage their attention are—Can any part of the mine be worked on tribute shortly, and can that mode of working be gradually increased? If half of the stuff could be left underground a cost of drawing and dressing might be effected of, I think, 80*l.* per month; but that will probably be more than counter balanced by lodging half of the stuff underground by tutwork men, inasmuch that if 2 lbs. of tin in a ton be mixed with the part not drawn, that of itself would be equal to the saving on drawing and dressing. Tributers, having an interest in the value of the tin, would carefully send all the tin possible to surface. I think there are, however, rather serious obstacles in the way of working on tribute just now. The men are not accustomed to tribute on such a lode and branches as in this mine. The north lode, recently cut, containing as it does copper, as well as tin of some value, taking into account the geological position of the mine westward and deeper, adds very much to the value of the mine as a speculation.

Camborne, Jan. 3, 1859. —— CHARLES THOMAS.

THE PROGRESS OF MINING IN CORNWALL.

SIR,—You lately did me the courtesy to insert a letter of mine on "The Progress of Mining in Cornwall," in which I called attention to certain districts highly metalliferous, and promised, if permitted, to go more into detail. Circumtances prevented my doing so sooner, but before entering upon the matter allow me to assure you, *apropos* of my recent tour of mine inspection in the great south-western mining county, that I found great activity and enterprise everywhere prevailing. The demand for tin is stirring up not only Cornish men and Cornish soil, but capitalists who formerly entertained prejudice against mining investment are now directing their attention to it in London and elsewhere. Consequently old mines are again opened up, new ground is broken, more adequate means are put forth to bring the ores to market, although in this respect there is not even yet the wisdom and enterprise which it would be desirable to see in the working of this most lucrative, beneficial, and national industry.

It will be in your recollection that in a former letter I called your attention to the necessity of preserving the shafts, timber, and other works of mines when abandoned, on the ground that they might be again occupied by other adventurers, who would derive encouragement from the fact that they would find all things to their hand, whereas if all were in delapidation and ruin, into which condition many abandoned mines have been permitted to fall, enterprise is deterred by the very appearance of things to a far greater extent than the circumstances justify. It is satisfactory to see that the notice taken by me in your columns of this subject has led to its discussion elsewhere, especially in the south-west, as is shown by the following passage from a contemporary published in that region. Under the heading "Old Mine Shafts," a correspondent writes:—

"The discussion in your columns, and your comments on the question of properly securing old mine shafts have not, I am happy to say, been all in vain. Mr. Ennys has had more than 20 mine shafts on his property efficiently protected, and Lord Falmouth and other landowners have also had their special attention called to the matter."

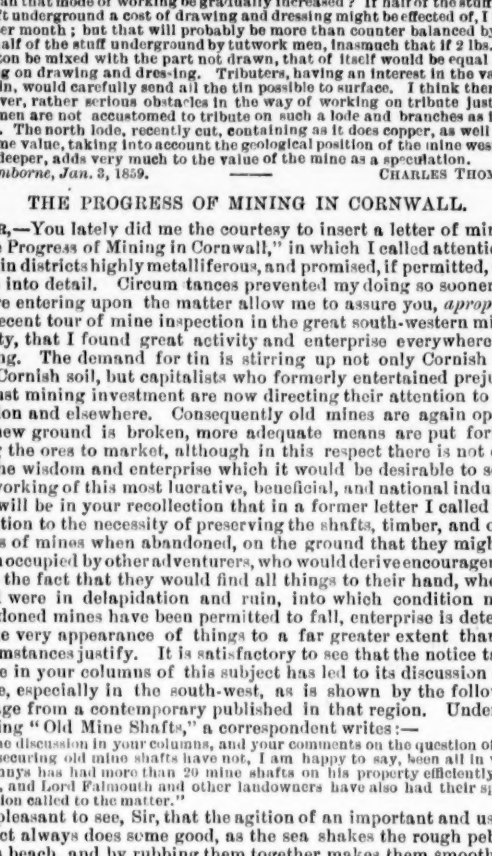
It is pleasant to see, Sir, that the agition of an important and useful subject always does some good, as the sea shakes the rough pebbles on its beach, and by rubbing them together makes them smooth.

I will now proceed to notice again the district of the Red River in Cornwall referred to in my last letter. Before doing so I may name the fact as important, in connection with mining districts, that it has often been alleged that in various countries, notably in America, lodes will run ten miles, and may be followed, and found, and utilised at that distance. It must not be forgotten, however, that many circumstances in connection with the geological character of the country may break up, interrupt, or alter the lode long before reaching so remote a position. Still it is agreeable to know, and useful to remember, that very generally in good mining countries the valuable lodes extend to considerable distances, encouraging the breaking up of ground in the vicinity of where they are originally discovered.

The Red River is a very interesting district, as before pointed out to you. I now, however, send you the engraving of a topographical sketch, which will enable your readers to follow the course of the stream from its source at Forest Farm to New Seaton at its other extremity, or, at all events, practical and utilised extremity. The reader will perceive that both on the left and right of the bank of the river there are, so to speak, strings of mines, stretching along like a chain with many links. About the centre of these, on the left bank, is the notorious and celebrated mine known as Dolcoath. On the other side appear the names of mines scarcely less distinguished. If your readers will kindly take the trouble of running the eye over the sketch, they will at once identify the names they peruse with triumphant mining enterprise and a brilliant mining history, and feel at once astonishment at the wealth of so small a district, reminding one of Goldsmith's village schoolmaster—

"And still the wonder grew
That one small head could carry all he knew."

It is wonderful that in the short and almost straight course of the brook dignified by the name of Red River such vast treasures should be borne.



The little rivulet just noticed suggests another—Carnons Stream. It is well known to mineralogists and geologists, and is in several perticulars remarkable. It is so for the vast amount of tin taken by streaming and by mining out of the silt and sand deposited in or near its junction with the tidal water of the Restorguet Creek, which is an arm of the Fal river. The tin taken from this deposit was washed down the valley from the mines in the Gwennap district from the backs of the innumerable lodes which it contains. Another remarkable circumstance connected with it is that the Great Adit, *alias* the Poldice Adit and the County Adit, discharges its waters into this stream.

This adit unwaters a greater number of mines than any other in the world. Its length (including branches) is about 33 miles, its depth 50 fathoms. It was commenced in 1768 by the grandfather of Sir Wm. Williams, Bart., to unwater Poldice and other mines in the vicinity. It was afterwards at different times extended in many other directions. The following list will comprise the majority of the mines drained by it:—Clifford Amalgamated (Consols United, Wheal Clifford, and Wheal Squire), Tingtang, Penance Consols, Carharrack, East Damsel, West Damsel, Wheal Jewell, West Jewell, Wheal Pink, Trefula, Wheal Clinton, Wheal Garland, Poldice, Wheal Unity, Wheal Unity Wood, Wheal Maid, Creegbraws, Great Wheal Busy, Boscawen, Halenbeagle, Wheal Chance, Treskerby, North Downs, North Treskerby, East Downs, New North Downs, Briggan, Cardrew, Wheal Harmony, &c.

When all these mines were at work the volume of water issuing from the adit was very large. To utilise this water in working that portion of Clifford Amalgamated called Wheal Andrews an adit was brought up from Carnon, a few fathoms deeper than the great adit, so that the water might pass over two water-wheels, to drain the Union Mines (as Wheal Andrews and Nangiles were then called, 1822), and worked by Messrs. Williams and Co. Between the tail, or outlet, of the adit water there are numerous precipitate works, for taking the copper outlet of the adit water. This is accomplished by laying down scraps of iron in drains, for taking the copper held in solution in that water. The iron attracts the particles of copper, which after a few days or weeks is scraped off, and sold at a high price, being nearly pure copper.

The mines in the Gwennap district have paid greater dividends than any others in Cornwall, and several have supplied more ores than even the Devon Great Consols. I will give a few instances of great success. The Consolidated Mines yielded to one company a profit of about 600,000*l.*; Wheal Clifford, before the amalgamation 200,000*l.* Wheal Squire gave large profits; I have not before me the definite sum. Wheal Jewell, 300,000*l.*; Wheal Damsel, 20,000*l.*; Wheal Unity, 350,000*l.*; Treskerby, 200,000*l.*; North Downs, 300,000*l.*; Harmony and Montague, 250,000*l.*; Tresavean, 450,000*l.* Treviskey, Trethenal, and Brewer gave large profits, but I do not possess the precise figures. Wheal Buller gave 300,000*l.* There are several others where the profits were great, but it is difficult to get at the figures definitely and certainly. What is here disclosed abundantly reveals the fecundity of this district in metalliferous treasures.

Permit me, if I have not already trespassed too far upon your indulgence, to direct the attention of your readers to the Terras district. This is an excellent mining country. The tin is near the surface in nearly all the lodes. The geological and mineralogical indications of the neighbourhood are exceedingly favourable. Up to the present time the lodes of this district are not developed in depth. Nearly all the setts in the neighbourhood are taken up. The Terras is a very old mining distrtct, yet, the anomaly is allowable, it is also a very young mining district—it has only been begun to be deveveloped, and the scope is magnificent.

"The nations have fallen, but thou are still young;
Thy sun is but rising, while others are set,"

may, with a change of the word nations for some other, be applied to the Terras district, as compared with those more developed and worked. What is wanting here is that the adventurers really operate both in depth and extension; let them work into the heart of these fine setts, and bring forth their treasures.

I have expressed as much, Sir, as can possibly be brought into the compass of a single letter. I thank you for your courtesy in affording me an opportunity through your columns of making these statements to the mining and investing public, and for urging these arguments.

THOMAS SPARGO.

Gresham House, Old Broad-street, May 18.

CASTLE AN DINAS TIN MINE.

SIR,—I have read the report of Mr. Henwood on this mine in last week's *Mining Journal*, and I can fully bear out the truth of his remarks. I have been closely and practically acquainted with the locality for the last 50 years, and I drove the adit he speaks of 40 years ago, in doing which we passed through 12 or 15 lodes good for tin, and all intersecting the great stanniferous elvan. I am an old man, and have given over the battle and business of life, and am going out of the world. I have nothing to gain by the success of this or any other company, but it is a pleasure to me, which I cannot refrain giving utterance to, to see the firm conviction of a long life realised. I have always insisted that great riches lay hid on the southern slope of Castle an Dinas hill, and now the truth of my assertion is apparent. There is profitable work in this mine for generations to come, and I heartily wish the company success.

Tregonetha, St. Wenn, May 17. THOS. BREWER.

[For remainder of Original Correspondence see to-day's Journal.]

IMPROVEMENTS IN STAMPS.

Although numerous contrivances have from time to time been introduced for the crushing of minerals, it is still the very general opinion among practical men that there is nothing to surpass stamps; yet in connection with these very necessary implements the improvements hitherto suggested have been comparatively unimportant—there has always been the same necessity for the application of a large amount of power to work them, and the same objection that, owing to the unequal wear of the stamps-heads the heads become useless, whilst there is still ample weight in them to perform the work required. The rotation of the stamp has, it is true, been effected, but in many cases the arrangement has been so clumsy that the stamps, taken as a whole, were no real improvement upon those which they were designed to replace. Reference was made a few weeks since to some improved rotating stamps, invented by Mr. JOHN WALKER, of James-street, City-road, and we have now had an opportunity of examining a battery of them in actual working previous to their shipment to the mines at which they are to be used. The ease with which the stamps work may be judged of from the circumstance that one man was capable of working the battery of three heads, the crushing power of which is equal to 3 tons of gold quartz per day. No portion of the machine weighs more than 1 cwt., and the battery complete can be delivered in London for 30*l.*, so that there need henceforth be no cause to complain that mine owners are unable to test their property owing to the large outlay necessary for machinery to extract the precious metals.

The improved stamps consist of octagonal heads connected by ordinary rods to the discs upon which the lifters act, and the essential feature of the invention consists in always having two lifters, which are arranged on opposite sides of the rod, acting simultaneously to raise the head. The effect of the lifters acting in pairs is to prevent all unnecessary friction by causing the lift and fall of the rod to be at all times absolutely perpendicular to the bed. The mode in which this is effected is extremely simple; there is a shaft on each side of the stamps rods, each carrying a toothed wheel of similar size, which takes into the other. The power for working the shafts which carry the lifters is applied through a third shaft, provided with a suitable fly-wheel and handles, which, however, can be removed when it is practicable to substitute steam or water power for manual labour. Mr. Walker's arrangement permits of the height of the lift being increased to any desirable extent, and as it is well known that the effect of a small weight falling from a given height is equal to that of a larger weight with a smaller fall, the advantage of the invention will be readily appreciated. Practically Mr. Walker reduces the gross weight of a battery of given power by about one-half, and as each head makes a portion of a rotation after each blow the wear is perfectly even, and the durability of the heads as well as the other parts of the machine is consequently much increased; the advantage of which in localties where it is not easy to obtain new castings will be at once apparent.

The value of inventions of this character in the various states and territories on the Pacific coast of America, and in other countries similarly situated, can scarcely be over estimated; and it is beyond question that, if such stamps were obtainable in San Francisco, at even double the London prices, it would be altogether unnecessary to seek British capital for the development of American mines. It must, indeed, be a poor ledge in California, Nevada, Arizona, and the neighbourhood, the owners of which could not raise amongst them the price of a $300 stamps battery, and the cost of getting it to the property; and as this would enable them to treat 3 tons of stuff per day, they could quickly provide themselves with all the milling plant that could possibly be required. Ledges yielding stuff the crushing of 3 tons per day of which would fail to supply, out of the returns, an abundant surplus for the purchase of all plant necessary for completely testing the property, should never be offered in the market; and mines which can make returns sufficient to provide milling plant would seldom have to seek in foreign countries for capital to develope them, and the few which, owing to exceptional circumstances, really did require capital would have less difficulty than at present in obtaining it, as they could test every ledge, and thus procure unquestionable evidence of the value of the several deposits previous to bringing it into the market. The invention appears to be one that is capable of very extensive application, and one that is calculated to prove alike advantageous to the manufacturer and to the miner.

UTILISATION OF SMALL COAL.

Referring to the preserved coal manufactured under the patents granted to Mr. H. W. WOOD, of Cardiff, it was stated in the *Mining Journal* of March 11 that further patents had been taken exclusively for improved machinery, adhering to the same principle so successfully developed under his former patents. It is claimed that the machinery is now reduced to a minimum of cost and simplicity consistent with durability, and the buildings and general apparatus are believed to be the realisation of all previous attempts to combine economy with efficiency. Although for many reasons it is more advantageous to erect works on an extensive scale, say at coal ports, where there is a concentration and collection of small coal, still small works suitable for collieries in inland, and for domestic purposes may be put up, and worked at a greatly diminished outlay, both for machinery and plant, so as to be within the reach of all who desire to utilise their small coal. For this purpose special machinery on a diminished scale has been designed.

This apparatus consists of a hollow heating cylinder, which is heated internally by placing a furnace at one end thereof, the flame and hot air from which pass through the cylinder; or the heating may be otherwise effected, for instance, by having a fire within the cylinder, or by bringing the flame and hot air from a finishing amalgamating apparatus around a regulating receiver, and onwards through a drying cylinder, into which a further supply of heat may be conveyed from the boiler furnaces when and if necessary and convenient to do so. The heating cylinder or cylinders must be provided with dampers wherever necessary to regulate the draught according to varying conditions of coal. The cylinder is also furnished externally with a number of shelves, and is made to rotate horizontally, or nearly so; it is also enclosed in a casing to keep in the dust and to receive the dry and hot coal. Coal is supplied to the shelves of the cylinder from a suitable hopper, and after having been thoroughly dried and heated is discharged either intermittently or continuously into a receiver placed horizontally, vertically, or in an inclined position. In this receiver there is added to every regulated quantity of dry hot coal its proper proportion of powdered pitch or other similar or suitable material or materials. The receiver is kept hot by the flame and hot air either from or to the cylinder being made to pass through an outer casing or jacket, and the receiver is furnished with a revolving screw-shaft, which stirs up and propels forward the mixed materials to the top of a hot amalgamating and finishing mixer, which effects a very perfect and thorough amalgamation of the materials. From the amalgamating and finishing apparatus the mass passes into strong moulds, in which it is pressed by suitable power, either wind, water, steam, or hydraulic pressure, the last in preference, in which case he places below the amalgamating mixer an ordinary hydraulic cylinder and ram, with a circular horizontal table, in which the moulds are placed of sufficient strength to bear the heavy pressure required. The plunger of the press, on being propelled either upwards or downwards, or sideways, as most convenient, compresses the substance in the mould or moulds, which for the time being is or are in the requisite position. The ram may at the same time raise a lever with a separate plunger, and simultaneously discharge the compressed block or blocks, which may be pushed from the top, or the bottom, or side of the mould or moulds, as most convenient; or he attaches another small hydraulic cylinder and ram to discharge the block or blocks, and to give an intermittent rotary motion to the table and work the valves, thus causing the table of the press to rotate and the valves to act as and when required. The apparatus, although especially designed for drying and heating, for mixing and amalgamating, for moulding and compressing, may be respectively or in part applied to the preparation of many other substances which require drying and heating, mixing and amalgamating, moulding and compressing; for example, for the manufacture of forage biscuits in a portable and condensed form for horses and other cattle, also for the manufacture of fire-lumps, fire-bricks, and building bricks, and for drying grain and seed.

It will thus be seen that the invention embraces the entire process and machinery for making the fuel, so that one license, therefore, includes the whole; and it is claimed that the cost of labour is materially reduced, breakages and excessive wear and tear especially guarded against, and that there is a great and increasing demand for the preserved coal at remunerative price.

SMELTING FURNACES ON A NEW PRINCIPLE.—We learn from our Western exchanges that the Union Pacific Railroad Company has built several large iron furnaces for smelting the Wyoming Valley ores, on a new and somewhat ingenious principle, invented by the foreman of the company's shops. In these furnaces the ordinary fan-blower is dispensed with, and the blast of air is obtained by injecting jets of steam into the interior of the upper portion of the furnace. The vacuum thus created draws a blast through the fire with tremendous force, securing all the heat needed to smelt the ore, which does not fuse readily. The furnaces already built on this plan have been running very successfully for several weeks, and others are in course of erection. Foundries are also building, and the company expects soon to supply itself with all the castings it requires, at a cost much below that at which they have heretofore been obtained from Missouri and the East. The plan of creating a blast of air by means of an ascending column of steam is not a new one, but its application to smelting furnaces has not, so far as we know, been before attempted, and the improvement thus obtained over the fan-blower may be found important as simplifying the machinery of blast furnaces.—*Iron Age* (U. S.)

EARTH-BORING APPARATUS.—Messrs. W. A. MARSHALL, Canonbury, makes the auger in the form of a flat plate or disc of metal served in a radial direction from the centre or boss (on which the blade is carried) to the circumference, the two jaws of the blade thus formed presenting a V-shaped opening in edge view. The part which projects from the lower surface of the disc forms the cutting edge, the earth broken up thereby on the rotation of the auger passing through the radial V opening on to the upper surface of the plate, whence it is removed from time to time by raising the auger from the hole. The auger or blade is fixed at right angles on a shank or stock, which is formed with a square end to receive the boss of the blade, the latter being secured by a tapering metal point screwed into the end of the stock. It is preferred, however, to connect the point and cutter plate to the stock by means of a socket piece. The point is provided with a quick spiral groove or grooves to form a rimer for the purpose of drilling a hole in advance of the boss of the auger, and so facilitating the penetration of the latter. The stock of the auger consists of two or more sections of tubes screwed together and provided with sockets for the cross handle used for rotating the auger, said cross-bar being removed from one socket to the other next above, as the depth of the boring increases.

LAMPS.—When applied to the lamps other than miners' safety-lamps the improved lenses of Messrs. J. COUPER and W. H. RICHARDSON, Lanark, may be inserted in the lamp case or lantern in the same manner as that in which the ordinary lenses at present used are inserted, but when applied to miners' safety-lamps the lenses are made annular so as to completely encircle the light, the lower part of the lamp, case, or lantern being preferably formed with holes or tubes covered with gauze wire so as to admit the air for combustion beneath the lens. In constructing the lenses and reflectors the glass of which they are formed is pressed or blown whilst in the fluid state into moulds of the required shape, wherein when solidified it permanently receives the necessary form. The lenses and reflectors constructed are of several forms, but in each of which the illuminating power is intensified through the refraction and reflection of the rays of light by dioptric annule and prismoidal projections or indentations.

REVIVIFYING GAS-PURIFYING MATERIALS.—As an example of the application of the invention of Messrs. A. M'NEIL and W. WHEATON, Exeter, oxide of iron, which is commonly employed for the purpose of purifying gas, may be taken. When this material has become saturated with the sulphur, ammonia, and other impurities for which it has an affinity, it is usually removed from the purifier and exposed to the air, for the purpose of allowing the sulphuretted hydrogen and ammonia to escape, which they do, into the air and become a great nuisance. This nuisance is prevented by this invention by taking the spent or saturated oxide of iron and placing it in a close vessel, in which it is exposed to heat for the purpose of driving off the volatile or gaseous matters, which are conducted by a pipe to another vessel containing animal matters and other substances which will absorb the gaseous vapour evolved from the iron. Any gases that may escape absorption in this vessel are conducted to another, which is supplied with fresh oxide of iron, and as this substance has a strong affinity for the sulphur and ammoniacal gases, it will quickly absorb or take up any that may escape from the other vessel.

LUBRICATING APPARATUS.—The invention of Mr. J. P. FERRIS, Leyton, consists of a chamber of any desired form and size which contains the lubricative matter. The upper part of the said chamber is formed to receive a cock or plug, which embraces a channel or aperture for feeding the chamber with the lubricative matter, another for regulating the discharge of the said lubricative matter, and a third for permitting the escape of the displaced air during the process of filling the chamber. At the lower part of the chamber is a screw plug for releasing the water that may have accumulated therein. Through the centre of the chamber passes a table for the double purpose of conducting the steam to the said chamber and permitting the escape of the lubricative matter therefrom.

SEPARATING SUBSTANCES BY THEIR SPECIFIC GRAVITY.—By the invention of Mr. H. C. CARVER, Flint, the mixtures of substances or materials to be operated upon are first reduced to a granular state, if they do not already exist in that state. The apparatus consists of a cylinder placed in a horizontal or inclined position, and arranged to rotate upon a central axis or upon exterior bearings or friction pulleys. To the inside of the cylinder a series of vanes are fixed spirally in the cylinder or in a line parallel to its axis. At one end of the cylinder a blast or exhaust pipe is fixed to blow or draw a strong current of air through the cylinder. If a blast pipe is used the material is fed to the rotating cylinder at the end opposite the blast pipe from a hopper, or by any other suitable means, there being an annular space between the blast pipe and the rotating cylinder to allow of the escape of the heavy material, while the other end of the cylinder is left as open as possible to allow the lighter matter to be carried away by the blast. If an exhaust blast is used one end of the rotating cylinder may be left open entirely to discharge the heavy material and admit the air,

and the exhaust pipe may be connected to the other end of the cylinder with a pipe for feeding the mixed material, which may occupy a central position in relation to the cylinder. The blast or exhaust current of air may be produced by a fan, pump, steam jet, or other means, and when the material to be operated upon is in a wet state the blast may be heated.

THE AMERICAN DEMAND FOR IRON.

The United States continue by far our best customer for railway iron. This will be seen by the annexed table, which illustrates the exports of British railway iron to the Great Republic during the first four months of the last three years:—

Month.	1871.	1870.	1869.
January.....Tons	28,264	24,610	20,421
February	32,784	32,957	21,939
March	41,917	23,222	40,152
April	32,456	37,016	33,565
Total	135,421	117,805	116,077

Notwithstanding the vigorous impulse which has been given, then, to American metallurgy since the close of the great civil war—and the Americans have now, happily for themselves, entered upon their seventh year of internal tranquillity—the United States have been compelled to import more and more British railway iron. The magnitude of their consumption of this description of iron is, indeed, one of the principal causes of the animation which now characterises British metallurgy; and under these circumstances, considerable interest attaches to the question whether the present state of affairs is likely to continue.

Certainly it will not fall off from any lack of railway projection and enterprise in the United States. Never, probably, in the whole course of American history have such vast and comprehensive railway schemes been projected as those which are now on hand in the Republic; and it has been found necessary to make heavy appeals to English capital, as well as to English iron, to carry many of them out. Not content with the existing Pacific Railroad from Omaha to San Francisco, American capitalists have undertaken another great line from east to west, and to be known as the Northern Pacific. This mighty iron road will start eastwards with two forks, the one leaving Duluth, Minnesota, at the head of Lake Superior, and the other St. Paul and Minneapolis, on the Mississippi. These two forks unite in Central Minnesota, and the trunk line will then pursue its course steadily westwards through Central Dakota and Central Montana. In the last-mentioned territory the road will again bifurcate—one arm passing through Central Washington to the main ocean terminus on Puget Sound; the other following the valley of the Columbia through Southern Washington and Northern Oregon to Portland. Branches will be thrown out from Puget Sound to Portland, and also from a point in Western Minnesota to Pembina, in the new north-west territory of the Dominion of Canada. It is obvious that this Northern Pacific line is of the most vast and stupendous character; and it is being prosecuted with characteristic American energy, for while ground was only broken in July, 1870, the management expects to have at least 560 miles of line in effective working order by the close of the present working season. The whole line with its braches will not, however, be in working in all probability before the close of 1873. Meantime, the demand for rails for this great line alone must be very considerable during the next twenty-five or thirty months; this demand may not be directly felt in Great Britain, but it must create a void in the general American iron trade, and indirectly, at any rate, it must sustain and stimulate the consumption of railway iron on American account.

The Northern Pacific can scarcely fail to open out the mineral and general resources of enormous territories which thus far have been almost untrodden by the foot of man; and it is curious to note the new names which are already coming before English eyes. We have heard often enough of New York, Philadelphia, Baltimore, and Boston; and even Chicago and St. Louis are places which have conquered a fame throughout the world. But until within the last few months whoever heard of Duluth, Omaha, and Denver? They are realities notwithstanding, and are, in fact, the advanced outposts of American civilisation. Gradually they will increase in population and importance, and for Duluth a future as brilliant as that of Chicago is even predicted. As years roll on, the Northern Pacific Railroad will open up new spheres for human effort, and we shall hear of new and yet new towns, from which spurs and loop lines of all kinds will doubtless be thrown out. In fact, as population advances into the great West of America there is practically no limit to the prospect of railway extension.

The question, of course, arises, however, whether American metallurgy will not in the future prove itself more able to keep pace with the American demand for iron. Possibly it may, but, at the same time there are some circumstances which point to a contrary conclusion. In the first place, American railway bonds find a tolerable acceptance in England, and where bonds are sold orders generally follow. In the next place, the almost boundless outlets which the United States afford for the employment of capital, and the comparative ease with Americans—at least, such of them as are industrious and intelligent—can obtain a livelihood, and even a competence, are circumstances which tend against a complete development of American metallurgy. We shall possibly enough lose the American market in time, but not for a good many years; and in the intervening period the United States bid fair to be, as they are at present, one of the best, if not the best, customers of the British iron trade.

FOREIGN MINING AND METALLURGY.

Correspondence from Liége states that the demand for pig and iron has improved, and that prices are very firm. Some contracts of some importance are stated to have been concluded recently by Belgian mechanical firms for locomotives and trucks. Russia and eastern countries are the principal outlets of the Belgian works, but Belgium has now not only to contend with England and France, Germany having become her most redoubtable rival. The great workshops of Ligl of Vienna, Borsig of Berlin, and Strousberg of Hanover, and the construction establishments of Berlin, Breslau, &c., are powerfully and thoroughly equipped with tools, and enjoy a good credit with the companies which are constructing Russian, Hungarian, and Turkish lines. The German works possess one very great advantage over the Belgian; they obtain ready assistance from the numerous German establishments of credit which have been formed of late years, in respect to the negociation of the railway bonds which they are obliged to accept in payment, and which are readily sold both at Frankfort and at Amsterdam.

Like most of the Prussian industrial establishments, the Prussian State collieries at Saarbruck experienced last year the unfavourable and disastrous effects of the Franco-German war. Thus the Saarbruck collieries had produced 6,893,942 tons of coal in 1869, and in 1870 the total fell to 5,475,920 tons. The influence of the war becomes all the more painfully evident when one observes that of the last-mentioned total 3,665,489 tons were produced during the first half of last year, and only 1,810,431 tons in the second half, the commencement of which nearly coincided with the outbreak of the war. Thus the first half of 1870 yielded 504,951 tons more than during the corresponding period of 1869, while the second half of last year remained 1,922,973 tons below the corresponding half of 1869. On the other hand, the Reine Louise Colliery produced a larger quantity last year, notwithstanding the war, the total extraction having been 1,298,364 tons, or 149,343 tons more than in 1869. The royal colliery yielded 1,586,548 tons last year, or 53,728 tons less than in 1869. These two collieries are situated in Upper Silesia.

The price of coal has experienced no change in the Belgian basins, notwithstanding the considerable stocks which have accumulated. Present prices are evidently but slightly *en rapport* with the state of the collieries; but the cause of the prevalent depression—the partial closing of the French markets—being regarded as only temporary, a reduction in rates is considered to be out of the question. The demand on Belgian account keeps up pretty well, and the colliery owners know very well that as soon as order is re-established in France stocks will be easily and promptly absorbed. For the present, however, the stocks held being considerable in all the collieries, the Belgian coalowners find themselves unfortunately compelled to materially reduce their extraction; some companies have thus curtailed working operations to the extent of one or two days per week. The consequences of this state of affairs are, of course, painful for the working miners, although a great number of them have abandoned mining labour for other employment. This change of avocations has gone on to such an extent as to disturb colliery owners, who foresee the day when the demand for Belgian coal will be considerably in excess of the extraction. The Bleyberg-es-Montzen Mines and Foundries Company will pay June 1 a dividend for 1870 of 4*l.* 4s. per whole share. The Béthune Mines Company (France) has been paying this week a dividend of 3*l.* per share for 1870-1. The Arenberg (Prussian) Mining and Metallurgical Company is paying a dividend at the rate of 6 per cent. for 1870.

Little has been doing in copper at Havre. The sale has been noted, however, of 95 tons of Chilian, in bars, at 67*l.* per ton, Paris conditions, showing an advance of 1*l.* per ton on the previously quoted rates. At Marseilles copper has been quiet, without variation in price. The German copper markets have been pretty well supported. At Cologne the movement of affairs continues to be regular, and has even become more active since the definitive conclusion of peace. Affairs have been quiet at Berlin for several days past; transactions to meet consumptive requirements have also been rather more restricted; at the last dates, however, there was some improvement in business, and prices have been generally maintained. At Hamburg copper has continued firm, and has sold regularly to meet consumptive requirements. Some transactions in Banca tin have taken place in Holland at 75¾ fls. The demand continues satisfactory, and there do not appear to be any apprehensions of a fall. Billiton is scarce; disposable is held at 75 fls. At Amsterdam tin is quiet; some small lots of Banca have found purchasers at 75¾ fls., and on these terms there is scarcely anything to obtain. Disposable Billiton has been dealt in at Amsterdam at 75¼ fls. At Berlin business in tin has been rather active, and prices have been supported with firmness. At Hamburg there has been little passing in tin; at Havre, however, the sale has been recently noted of 274 ingots of Peruvian at 120*l.* There has been little change generally in lead.

The slight revival in zinc noted a few days since at Breslau has been scarcely maintained. At Berlin and Hamburg there has also been rather a downward tendency.

SOUTH AURORA SILVER MINING COMPANY.

The success attending the development of this property is shown in the fact that 98 days' working has resulted in a net profit of 20,600*l.* In accordance with the contract made with the vendors, the company at the time of the transfer of the property was entitled to the net proceeds of the mine from Sept. 1, which up to Dec. 31 amounted to $103,058, or 20,600*l.*, the working days at the mill being—in September, 14; October, 24½; November, 28½; December, 31: total, 98. The accounts since received from the company's bankers at San Francisco show the corrected amount of net earnings to be slightly more than this, reporting the balance to the credit of the company to Dec. 31 to be 21,075*l.*, which amount has been paid to the company's bankers. From this fund a dividend at the rate of 20 per cent. per annum on the allotted stock was declared on Feb. 18. Interest at the rate of 5 per cent. on amounts fully paid up in advance of second call was also paid. At the time of the transfer of the property the only engagement with any other enterprise reported by the manager was one made for the purpose of reducing the cost of hauling ore from the mine to the mill, with the Eberhardt Company, for the use of their wire tramway, which was calculated to effect a considerable saving in this respect.

The operations at the mine have been continued most satisfactorily, but a severe storm about the middle of February so impeded hauling that the manager deemed it prudent to stop the mill (on Feb. 20), and wait the completion of the Eberhardt tramway, which was then confidently expected within two or three weeks. The delay, except in so far as it retarded the production of bullion, has not been prejudicial to the interests of the company, as the mine has been steadily worked, and a large supply of ore accumulated. The sorting platforms have been rebuilt and much enlarged, a new ore-house, 85 by 90 feet, erected, and every effort made by the manager to employ the interval between the stoppage of the mill and the starting of the Eberhardt tramway so as to ensure a full and continuous supply of ore for the rest of the season. Subsequent severe weather and some alterations in the construction of the tramway again delayed the completion of that work, and it was decided not to postpone starting the mill longer on this account. A quantity of ore had been hauled to the mill by road, as before, and on April 14 the manager reported 1127 tons at the mill, and in the ore-house at the mine 300 tons dressed, and about 4000 tons undressed ore. By telegram received last week the directors were advised that that the mill started on May 1. The consequence of the delay in the completion of the Eberhardt tramway to this company has been that the mill ran only 32 days during the quarter ending March 31. The amount of ore treated was 1706 tons. The bullion realised $56,202·47.

The manager reports that if it had not been for the interruption of the work at the mill the net result of the quarter would not have been less than $100,000. The expenses of the quarter are reported at $45,852·99, and, deducting this amount from the value of the bullion produced in the thirty-two working days, the net proceeds are $10,349·48.

It appears that the directors have received a communication from the vendors recognising that the stoppage of the mill, in consequence of the delay in the construction of the tramway, may be fairly considered as the result of a contract entered into by the manager before the final transfer of the property to the company, and that 20,000 shares issued to them according to the original contract be considered as deferred shares, so far as the interim dividend for the quarter is concerned. This arrangement has not only been accepted, but it is consider a very satisfactory evidence of the *bona fides* of the late proprietors, and of their confidence in the continued value of the property.

The balance of cash in hand is 16,064*l.* An interim dividend at the rate of 20 per cent. per annum (or 5s. per share), free of income tax, will be paid on June 1, on all shares registered on May 24, on the books of the company, with the exception of the 20,000 shares taken by the vendors under the original contract in part payment. The mine is in full operation, yielding a large and constant supply of ore, and the mill is in excellent order.

UTAH MINING COMPANY.

The results shown from the following, taken from the *Salt Lake Herald*, of April 28, leave but little doubt as to the success of the Utah Mining Company:—

The Buel and Bateman Smelting Works, at Bingham, has again started, and is running splendidly, turning out from 6 to 6½ tons of bullion each 24 hours. Everything runs along like clockwork around the furnace and the mines of this company. Ore has been struck in tunnel No. 1, which was being run from the smelter to tap the company's mines, and proves to be of higher grade than any yet found in the mines at the surface.

Owing to storms which prevented the delivery of coal, this company have been greatly retarded in the prosecution of their works at Bingham. But coal now begins to come in freely, as well from the surrounding locality as from Salt Lake City. The great depth of the snow in the Bingham Mountains preventing, up to the present, a sufficient supply of fuel, this want is obviated by Col. Buel procuring coal from Truckee, and delivering it here at the works.

Several very rich strikes have been made of late in Bingham main canon of a fine grade of argentiferous galena; one in particular was discovered immediately west of the B. and B. furnace by some of the employees of that company. The ore is high grade, and the mine very extensive.

The snow now begins to disappear fast, when a lively time may be looked for here. All is bustle and activity, between grading and building city property, working of the placer mines, prospecting all over the hills, and consequent daily announcements of rich strikes and big discoveries, and, most important of all, the successful working of the Buel and Bateman Smelting Works, which must now convince the most sceptical of the possibility of a successful reduction of the Bingham canon ores, which heretofore were erroneously set down as so refractory that it was deemed impossible to reduce them. I am positively informed by the superintendent that these ores are of a most facile character for successful smelting, and that 2¾ tons of the mean average of the ore will produce 1 ton of bullion, and that 25 bushels of coal will reduce each 1 ton of ore, when properly fluxed.

BULLION COMING IN.—Bullion was arriving yesterday afternoon from the Bateman and Buel Smelting Works, Bingham canon, and being stacked up in front of the company's office.

MINING NEWS FROM COLORADO.

GEORGETOWN, *April* 27.—One ton of second-class ore from the South American lode, treated by Palmer and Nichols, has returned 106 ozs. of silver to the ton. The tunnel which has been run to cut the Dunedin lode, in Republican Mountain, has reached the vein; it has been run in 110 feet, and cuts the vein at a depth of 90 feet. The lode shows a 3-ft. crevice, and carries about 1 ft. of paying material. Since the tunnel cut the Terrible lode drifting to the east and west in the south wall of the vein has been going on; the lode looks well, and the same rich ore as was found in the upper levels is to be seen in the lode where cut by the tunnel. When connection is made between the tunnel and shaft mining will be much cheaper, and all expense for hoisting ore and water to the surface will cease. A correspondent in the Georgetown *Miner* says—"A ramble over Brown and Sherman Mountain on Monday last (April 17) afforded us an opportunity to gather up many items of interest in regard to our mining industry. The John J. Roe is surpassing the most sanguine expectations of everyone. Since our former visit to this mine, two weeks ago, the ore deposit has visibly increased in breadth and richness. Grey copper can be seen in almost every piece of ore mined out. The zinc-blende is disappearing, and the ore now raised is as fine smelting ore as we have ever seen. The ore deposit now has a breadth of over 2 feet.

Descending the mountain, we noticed that great activity prevailed about the Brown and Terrible Mines. The cars on the aerial suspension wire tramway of the Brown Silver Mining Company were playing a lively game of go down and go up. It is a stately sight to witness the descent of one of these cars loaded with a ton of ore. Arriving at the ore-house, a key is knocked out, the bottom of the car drops, and the ore falls directly into the mill. Ladies have rode in these cars from the mill to the mine. The miners on the Terrible were in a state of jubilant excitement over a big strike in the mine, about 2 feet of solid ore they said."

Messrs. Courtney and Vance had 1800 lbs. of second-class ore from the O. K. lode, treated at Palmer and Nicholl's works last week, and the ore yielded at the rate of 273 ozs. of silver to the ton (2000 lbs.) Mr. Bement, of the Washington Mill, shipped last week 5 tons of ore from the Steven's Mine, assays showed that it contained 175 ozs. of silver to the ton, and 60 per cent. of lead (1200 lbs.) per ton of 2000 lbs.

Palmer and Nichols have purchased a lot of ore from the Equator slide, for which they paid $631·91 currency per ton, and 1 ton from the Killinnig, for which they paid $450. The Stewart Reduction Company have purchased 1 ton of ore from the Munsell lode, Leavenworth Mountain, for which they have paid $590 currency, and a lot from the Aneta lode, owned by James Walker, which gave an average assay of $786 coin to the ton, and a further lot of third-class Comstock ore, Columbian Mountain, that gave an average assay of $106 coin to the ton.

There is now on exhibition at Thatcher, Standley, and Co.'s Bank, Central City, a magnificent specimen of ore, weighing about 15 lbs., from the bottom of the main shaft of the Caribou Mine. The specimen itself is worth about $100, as ore of that kind assays 12,000 ozs. in silver per ton. The pocket of heavy zinc-blende and galena, mentioned in our columns a few weeks ago, as occurring in the main shaft, has been passed through, and the bottom now shows nearly a 4-ft. vein of first-class ore, similar to that found on the surface. For the last few feet in sinking no third-class ore is found, and nearly all between the walls is rich first-class, carrying a large amount of black sulphurets of silver. The breast of the 100 ft. level, about 140 ft. west from the main shaft, shows over 2 ft. of rich ore. The east one-half of this mine has always shown less variation, both in the kind and quality of the ore produced, as well as in the width of vein, and seems to be well satisfied with holding its own, and turning out a steady supply of ore, carrying, according to its grade, from 150 to 800 ozs. in silver per ton by actual working.

FOREIGN MINES.

ST. JOHN DEL REY MINING COMPANY (Limited).—Advices received May 1, ex French steamer Gironde:—

Morro Velho, March 29.—GOLD EXTRACTED TO DATE.—The produce from the mineral reduced in the stamps during the second division of March, being a period of 10 days, amounts to 3014·5 oltas. It has been derived as follows:—

	Oltavas.		Tons.	Olts. p. ton.
From General mineral	2186·0	from	986·0	= 2·217
„ Gamba (West) ditto	828·5	„	242·0	= 3·423
Total	3014·5	„	1228·0	= 2·454

The stamps' duty is not quite so large as during the first division of the month, and the daily gold return is rather less, though the standard yield per ton of mineral treated is a trifle better.

The health of the establishment continues good.

Advices received May 13 *via* Southampton, per steamer Tycho Brahe:—

Morro Velho, April 1.—The sinking in the month of March measured as follows:—

A shaft	4	1	10
B shaft	4	5	0
Total	8	5	0

Advices received May 16, *via* Southampton, ex La Plata:—

Morro Velho, April 17.—GENERAL OPERATIONS.—The water received from the Cristaes Ravine, as conveyed by the water-course of the same name, and which forms the principal supply of the establishments, was turned off on the 4th current, in order to clean out that Rego, put in some launders, repair levels and water-wheel, and connect the reception cistern at Boa Vista with the new water-course and launders provided for conveying water across the establishment to the pumping-wheel on the east side of Salvador Hill, for working the new shafts. This water was off 16 hours, and all the work undertaken was satisfactorily accomplished. Such wheels as could be driven by water from the small upper water-courses are kept working.

PRODUCE FOR MARCH.—The produce extracted during March has amounted to 11,103 oltas. It has been derived as follows, viz.:—

	Oltavas.		Tons of stone.	Olts. p. ton.
From General mineral	7483·8	from	3332·0	= 2·246
„ Gamba (West) ditto	2651·2	„	868·0	= 3·054
	10,135·0		4200·0	= 2·413
Arrastra produce	764·1	}		= 0·230
Praia ditto	204·3	}		
Total produce	11,103·4		4200·0	2·643

The above shows 298 tons more mineral stamped in March than in February, the former having three more days for stamping; the standard yield of the mineral treated also shows nearly one-tenth of an oltava per ton higher. The improved yield is from the Gamba mineral.

COST AND LOSS.

Taking the produce at	11,103·4 oltas.			
Less loss in melting	29·4			
Total	11,074·0, at 8s. per olt.	..	£4429	12 0
Cost—Labour....Rs. 26,803 $528				
Other charges....Rs. 17,844 $930				
Rs. 44,648 $458, at exchange 24d. per milrel		.....	4464	16 11
Loss on months' working		.....	£ 35	4 11

FERNAM PAES ESTATE.

Outlay at Gaia level and tramroad, Rs.	496 $696, at ex. 24d.	.....	£ 49	7 4

NEW SHAFTS AND SURFACE WORKS.

Outlay for surface works	Rs. 6,334 $861, at ex 24d.	.....	£ 633	9 8
Ditto sinking and timbering	Rs. 11,862 $755,	„	1186	5 7
Total outlay	Rs. 18,197 $816,	„	£1819	15 3

The General costs in Morro Velho is Rs. 3600 more than was incurred in the short month of February, though it is below the general average; but the higher rate of exchange increases the sterling amount considerably. The outlay at the new shafts is heavy, and will be also again this month. After April I hope it will be much less.

MINES.—The attendance in the mine department has been regular, and the number of natives working gives the following daily averages, viz.:—

Natives boring	157·70—natives working	....	250·96
Others ditto	7·97—Others ditto	.....	207·37
Total	165·67		458·33

Being two more daily than the averge number of February gave.

The quantity of mineral quarried and delivered on the spalling-floors amounted to 5855 mine wagons, being equal to 35·34 wagons per borer employed.

In the Gamba, the sump has been sunk 4 ft. 6 in. vertically, and the stoping carried on regularly, giving a fair supply of mineral—4373 wagons during the month. The pump has been extended one length, 19 ft. of new rods added, one cross piece for extending bed of shaft.

The inclined plane (Edwards's) on the East Cachoeira has been extended, to get the kibble nearer the stoping space, and a catch stull provided for recovering the mineral quarried there. The requisite repairs to the timber work have been attended to in this section.

NEW SHAFTS SINKING, &c.—Previous to the end of last month a considerable stream of water was met with in the A shaft, which interrupted the boring in the sump for the time being. Although we were not perfectly ready, our pumping plans were sufficiently forward to admit of our bringing the pumping wheel to bear on the water in sump A.

Two pump lifts, one 15 and the other 10 fms. in length, were erected in shaft A, below the permanent plunger lifts.

WATER BROUGHT INTO THE UPPER WATER-COURSE.—Arrangements were also made to turn the water into the new water-course at Boa Vista, and thence by the new series of launders to the east side of Salvador Hill to the pumping-wheel. April 4 being fixed for altering the reception cistern of the cistern water at Boa Vista, putting in the connecting launders there, and also for putting new launders and repairing others at the source of the Cristaes Rego, where the water is conveyed across the ravine, for cleansing that water-course throughout from its source to the cistern at Boa Vista. The cistern water was turned down the Corriego, and the work, as indicated above, was commenced throughout the whole length of the water-course about 3¼ miles.

This water was off the establishment from 8 A.M. to 12 at midnight, when the whole work undertaken had been completed, and the water was again made available for the water-wheel, stamps, and machinery, and also passing into the new water-course, and large launders recently erected across the establishment, it was conveyed in the desired proportion to the pumping-wheel for the new shafts.

The following day at 5·20, the lower pumps being ready, the pumping-wheel, rods, and bobs were put to work, and the next morning before 5 A.M. the water was forked in the sump of A shaft.

Since then the lower lift has been properly fixed, which could not be done until the shaft was cleared of the water; and we are now got into a regular way of working these, and look for progress in sinking. The shafts were measured yesterday, and gave the following results as regards sinking since the 1st inst.:—

A shaft has been sunk 0 fms. 4 ft. 9 in. .. 103 fms. 0 ft. 9 in. total depth.
B shaft has been sunk 2 fms. 1 ft. 1 in. .. 103 fms. 0 ft. 5 in. total depth.

Total, April 1 to 15, 2 fms. 5 ft. 1 in.

This is quite as good sinking as could be expected in B shaft, when it is remembered the hauling of the water there by the Cachoeira wheel was stopped 16 hours on the 4th of the month, and this had to be cleared by kibbles before the sinking could be resumed.

GAIA MINE.—The level has been driven 3 fms. 4 ft. into the hard rock covering the lode, and the tramway laid down the same distance. The rock is excessively hard and tedious for driving.

REDUCTION DEPARTMENT.—The stamps have been kept pretty constantly at work reducing mineral, though there has been some difficulty in keeping them properly supplied during the Easter Holidays. The following shows the general duty:—

Stamps working with 126 heads, average	29·85 days.
Stamps working each, daily average	121·32 heads.
Arrastres worked, daily average	26·37 days.
Arrastres, Praia, each	30·60 days.
Produce of each stamp-head per diem	2·80 oltas.
Produce of each arrastra	1·811 oltas.
Produce of each arrastra at Praia	1·116 oltas.
Produce of re-treatment on that of stamps	9·55 per cent.

The quantity of sand amalgamated amounted to 6·544 cubic feet, which yielded an average of 1·66 oltas. per cubic foot.

The unrecovered gold contents are shown as 1·080 oltas. per ton, which is a more favourable recovery than the previous month of February.

The amalgamating machinery has worked regularly and effectively during the month.

GOLD EXTRACTED TO DATE.—The mineral treated in the stamps during the

first division of April, being a period of 8½ days, has given the following produce:—

	Oitavas.	Tons. Oits. p. ton.
From General mineral.....	1898·0 ..... from	895·0 = 2·12)
From Gamba (West) ditto.....	552·0 ..... „	238·0 = 2·319
Total stamps	2450·0 „	1133·0 = 2·162

This is low produce, both as regards daily return (not being quite 300 oits.) and standard yield when compared with the last division of March, which gave 2·490 oits. per ton.

The health of the establishment continues good.

The gold was dispatched from Morro Velho on April 12, taking five boxes, containing 13 bars of gold, weighing in all 20,705 oits., equal to 198 9-13ths lbs. troy.

The agents are instructed to ship the gold per La Plata, appointed to leave Rio de Janeiro for Southampton on April 23.

N.B.—The La Plata having arrived, the gold was duly forwarded to the Bank of England.

DON PEDRO NORTH DEL REY (Gold).—Mr. F. S. Symons reports for March—Produce, 6316 oits., at 8s. 6d. per oitava, 2684*l.* 8s.; cost, 3259*l.* 12s. 8d.: loss 575*l.* 6s. 8d. Remittance, 13,506 oits. Attendance good, and works at the different sections prosecuted with the accustomed regularity. The produce has been mainly derived from lodes at Alice's west, which have yielded fair strakes but no box work; the bottom stopes are in abeyance. The cross-cut from Vivian's, to drain the same, has been driven 3½ fms.—good duty, considering the troublesome nature of the ground. The lodes at Alice's west above the level have been stoped regularly, and yielded the whole of the produce returned; no defined line has yet been encountered. Explorations at Tambor and Mato das Cobras have been regularly carried on—no gold yet encountered. To communicate to cross-cut from Vivian's a small incline has been commenced from the bottom of the old sump-shaft; it has been sunk in lode. Alteration to and erection of buildings for force has been attended to, and a large number of hands engaged in the excavation of the new wheel-pit. A large force is concentrated on this work, and parts of the pumping-machine continue to arrive in a most satisfactory manner.—For the first division of April, Mr. F. S. Symons reports the produce weighed to date, 2295 oits. I hope in my next to report that the lode or lodey matter has been struck in the cross-cut from Vivian's. Nothing new at any other section to advise. Explorations at Tambor and Mato das Cobras are being pushed on steadily.

GENERAL BRAZILIAN.—The report for March states that at St. Anna the old adit has reached the fundaos, or excavations, on the shoots of gold. They will be cleaned out and examined. Debris auriferous, a little water appearing, and foul air, somewhat impeding progress, but the latter will soon be remedied. At the shallow adit little or no alteration has taken place; the ground is still wet and very troublesome, and a change here for the better is a great desideratum. Haymen's shaft has been under suspension, owing to heavy rains; water percolated into it, but a small rise has been opened to said shaft from old adit, and this will allow the sinking to be resumed forthwith. At Itabira shallow adit another air-shaft, No. 5, has been completed, so the adit is again well ventilated. The ground is becoming more favourable, and better progress being made. At the middle adit the driving and sinking of air-shaft No. 2 have been under suspension, the latter owing to heavy rain, and the former to timberwork through the flookan requiring adjustment and strengthening; swelling of the flookan was the cause of this. Moore's shaft, too, has been under suspension, owing to heavy rain; but this shaft, the air-shaft mentioned above, and the driving of the middle adit, will be resumed, as the wet season must be nearly over. For the first division of April Capt. Thomas Treloar's letter states that the general operations to date are progressing fairly, but wet weather still operates against us. Though we have reached the middle of April the wet season is not yet over. Since the monthly report was written no change has occurred in the mine calling for special remark. The bottom of the fundaos at St. Anna has not yet been reached, but we can see that the shoots run somewhat deeper at Santos's and Haymen's shafts than information led us to believe. The debris still continues auriferous, and measures will be taken for stocking it; water increasing a little as we descend in old excavations.

ANGLO-BRAZILIAN.—Mr. F. S. Symons reports for March: Produce for the month amounts to 1540 oits.; cost, 1772*l.* 10s. 3d. The returns I regret are again unsatisfactory, no amelioration in standard of the lodes treated has taken place. Cost is heavy, owing to the special efforts made to clear Fundao workings, and effect communications from the deep adit to Foster's. The bottom stopes in Dawson's have been abandoned, and the force concentrated at the deep adit—Foster's and the Fundao. In April a separation of the stone from the latter will be carried on, and a large diminution in the working cost of the mine take place.—Pitangue and Agoa Quente: By letter from Capt. Treloar, dated the 21st, I was informed that the above properties had been purchased for the Anglo-Brazilian Company, and instructing me to take charge of the same; as soon as possible I proceeded there, and organised a small force. For the first division of April Mr. F. S. Symons reports: Remittance, 3069 oits. At Passagem works are progressing, and the separation of Fundao stone is in hand. The attendance of the force is sufficient for requirements, and the health of the establishment favourable. Heavy repairs are in hand at the Victoria stamps. The lining of the stamps-axle, south side, will be renewed, and the gudgeon of the water-wheel, same side, having become very loose, taken out, and replaced by the new one lately received from England.—Pitangue and Agoa Quente: Judicial "posse" was taken by Capt. Treloar on April 10. Mr. Lynch, of the General Brazilian, will shortly commence a rough survey, so that the site for the stamps and the deep adit be fixed on. About 20 people are at present employed, under the charge of Capt. Hosken. The shallow adit is being worked day and night. Rough accounts are at present kept by Capt. Hosken, and given to me, and checked when I visit the place once a fortnight or oftener. The distance from Morro de St. Anna is about 26 miles. It is expected that the shallow adit when it encounters the lode will give some fathoms of backs; this adit will form a main outlet for the ores. The stamps will be erected below. The cleaning and repairing of buildings are being carried on.

ROSSA GRANDE.—Mr. Ernest Hilcke reports for March:—Produce: The gold return for the month amounts to 1020 oitavas. Total cost, 10*l.* 3s. 5d. The operations have progressed steadily, and having received a further increase of native attendance good duty has been done. For the first division of April Mr. Ernest Hilcke reports: Remittance, 1658 oitavas, being the produce for February and March. The lode above the 60 fm. level maintains its favourable appearance, and is of fair yielding quality. At all other points of operations there is nothing new to note.

BRAGANZA (Gold).—April 15: Driven north on No. 3 lode 6 fms. 1 foot; the same is 6 feet big, and will turn out 12 tons of ore to the fathom, and a more splendid looking lode no man need look at; the specimen of visible gold mentioned in the telegram of last week came from this end. The lode is all through alike, composed of quartz, iron, schist, slate, &c., all good for the stamping-mill. We have begun to work the new stamps day and night, and shall endeavour to keep them going regularly now the holidays are over, and the men returned to their work.

CHONTALES (Gold and Silver).—Mr. Belt, April 6: Return of gold for March, 524 ozs., from 1154 tons of ore; average yield, 9 1-10th dwts. per ton; value, $7257, or 1451*l.* sterling; cost for the month, $5288, or 1075*l.* sterling, leaving a profit of 394*l.* on the month's working.

Mr. Belt reports—We have two months of profitable ore in sight, and are prosecuting such extensive explorations that the chances are greatly in our favour of finding something fresh before we exhaust our reserves. Independently of making discoveries of rich ore, the ground we are now opening out at the different mines will, I believe, pay when treated on a larger scale. The health of the establisment continues good.

Capts. J. Tonkin and W. Evans report for the month of March—San Antonio Mine: No. 1 stope, in the back of No. 6 level, has been stoped 65 varas; the lode is 6 ft. wide, worth 6 dwts. of gold per ton. No. 2 stope, in the back of the same level, has been stoped 60 varas; the lode is 3½ ft. wide, worth 9 dwts. of gold per ton. A stope in the back of No. 5 level has been stoped 63 varas; the lode is 3 ft. wide, worth 1 oz. of gold per ton. A stope in the back of the Connection level has been stoped 58 varas; the lode is 4 ft. wide, worth 15 dwts. of gold per ton. The No. 6 level has been driven west on the course of the lode 22¾ varas; the lode is 6 ft. wide, worth about 2 dwts. of gold per ton. The deep cross-cut has been driven 5¼ varas; the ground is hard, and difficult for driving.—Santo Domingo Mine: Marin's rise, in the back of No. 1 level, has been risen 16½ varas, and communicated to surface. A stope in the back of No. 1 level has been stoped 28 varas, yielding 6 dwts. of gold per ton.—West San Benito Mine: The rise at this mine has been put up 15½ varas, and holed to surface; we intend working an open cutting across the lode, in order to prove its value.—East San Benito Mine: The cross-cut has been driven 31 varas, and we expect to cut the lode underneath the old workings at the end of the present month.—San Sebastian Mine: We have commenced to drive a level on the San Sebastian lode, which is 3 ft. wide, producing a little gold, but not to value. It is reported by the old miners to have produced in the old workings quartz worth from 6 to 8 dwts. of gold per ton. We are pleased to state the mines are still looking well. The number of tons sent to the stamps for the month is as follows:—From San Antonio, 1064 tons, yielding 9½ dwts. per ton=497·8 ozs. melted gold; from Santo Domingo, 90 tons, yielding 6 dwts. per ton=27·00 ozs. melted gold; in all, 1154 tons, yielding 524·8 ozs. melted gold.

ALMADA AND TIRITO—Telegram from Mr. Clemes, dated April 15: Profit for March, $5339.

SIERRA BUTTES (Gold).—The following notice has been received from the secretary:—Clean up for April, $31,189; expenses, $11,618.

CUIABA.—April 14: Vivian's Level: We have successfully driven through the killas covering of this first lode we are intersecting, and have struck quartzose rock, impregnated with mundic, and are now in most favourable ground. Progress much retarded by saints' days.

TAQUARIL (Gold).—Mr. T. S. Treloar reports for March: I regret to say I am unable to report any amelioration in the state of matters in the mine with regard to produce. Little or no box-work has been derived from the shoots, and the auriferous quality of the general mineral raised for stamps has been excessively poor. The gold return, consequently, is the most unsatisfactory we have yet had, being the smallest since the stamping-mill was put to work. The expenses of the establishment are kept as low as possible, compatible with the efficient prosecution of the operations in hand. The produce amounts to 579 oits., from 662·40 tons. Nearly the whole of the mineral sent to the stamps has been broken from the top lode, which is less favourable for crushing than the under one, hence the reason of more stuff not having been treated. The little vein-stuff obtained shows great depreciation in quality, as compared with the preceding month's; but upon an increase taking place in the dimensions of the shoots, a proportional improvement may be expected in the yield. The works in the mine have been carried on vigorously. In the stopes our operations have been confined almost exclusively to the top lode, water preventing our working to any advantage on the under one. The shoots have presented no change for the better during the month in the top lode, indeed, the shoot at present can barcely be defined.

First Division of April.—(Extract from Mr. T. S. Treloar's letter, dated April 16.)—"I regret to learn that so much displeasure is felt by the directors and shareholders about the mine, though it must be admitted it is neither unnatural nor wholly unexpected. The unfavourable turn matters have taken with regard to produce was quite unlooked for, and has caused the keenest disappointment to all here also. Upon obtaining the extraordinary riches from the small quantity of shoot-stuff in July and the succeeding months of last year, corroborating apparently the good reports in circulation respecting the wealth of the mine, everyone on the establishment, as well as residents in the surrounding neighbourhood, were sanguine that the company had a brilliant future in store, and in the same spirit my advices were accordingly couched. But upon the stamps going to work, and the commencement of active operations on the lodes, we soon found that the shoots were bunchy, that in lieu of increasing or even maintaining their dimensions, they were becoming smaller and poorer, and further, that the general lode-stuff, as a body for the stamping-mill, did not produce so well as we had been led to expect. Hence the reason of my being compelled to communicate in recent despatches, views less favourable than those I had previously expressed."

General Operations.—Our operations are now confined almost exclusively to the mine, those at the surface, excepting the running work, being at present under suspension. In the features of the lodes there is no change to note; from the under one the water has been let down by a communication opened from the stopes of the top lode, and raising mineral for the stamps resumed in this section. The shoot in the latter is improving a little in size and quality, but that in top lode continues very disorderd. At Pinga d'Agua old workings were intersected yesterday. They are full of debris, and I am, consequently, unable to say more about them by this mail. The remaining exploratory points, which now include the Ponte Grande formations, are being prosecuted vigorously, but to date we have met with nothing calling for remark.

LUSITANIAN.—May 9: At Taylor's engine-shaft, below the 140, the lode is worth 1½ ton of ore per fathom. In the 140, on Basto's, the lode is 2¼ ft. wide, composed of quartz and ore, worth ½ ton per fathom. In the 130 west the lode is 3 ft. wide, yielding 1½ ton of ore per fathom. In the 120 east the lode is 8 feet wide, composed of quartz, with ore mixed through it, worth 1 ton per fathom. In the 110, east of River shaft, the lode is 2 feet wide, composed of quartz. In the 90 east the lode is 2½ feet wide, composed of flookan mixed with quartz. In the 70 east the lode is 4½ feet wide, composed of loose quartz and large stones containing lead. In the 38, on the Mill lode, the lode is 1½ ft. wide, composed of softish country. In the 38, west of slide lode, the lode is split into strings, all without ore, but letting out a stream of water. In Nos. 85 and 86 winzes the lodes yield ore worth ¾ ton per fathom. In No. 87 winze the lode is 5 ft. wide, and worth 2 tons per fathom. In No. 88 winze the lode yields stones of ore. In the rise above the 140, east of Taylor's, the lode is worth 1½ ton per fathom.—Carvalhal: In the 60 cross-cut, north of incline, the ground is a hard, tough gneiss. In the 60, east of incline, the lode is 1 ft. wide, composed of quartz and country. In the 50, east of incline, the lode is 2 feet wide, worth 1 ton of lead and blende together per fathom. In the 50 west the lode is 2½ ft. wide, composed of quartz, with stones of lead. In the 40 east the lode is 1½ ft. wide, composed of quartz and country. In the 30 east the lode is 3 ft. wide, composed of quartz. In the adit, on the caunter lode, the lode is 2½ ft. wide, worth 1½ ton of lead and blende together per fathom. In the 10, west of incline shaft, the lode is 2 ft. wide, worth 2 tons of lead per fathom. In the 20 west the lode yields 1½ ton of lead per fathom. In the 30 west the lode 2 ft. wide, and worth 1 ton of blende per fathom. In the 30, north of the great lode, the lode is 1½ foot wide, composed of quartz, with good stones of lead and blende.

[For remainder of Foreign Mines see to-day's Journal.]

AUSTRALIAN MINES.

YUDANAMUTANA (Copper).—The directors have received advices from their superintendent, dated Adelaide, March 29. He states—New Shaft: We are now down 31 fms., and I shall at once commence putting down the pit work to this depth. Capt. Phillips and our own engineers are quite confident that our newly-purchased engine will keep us dry for another 30 fms. Our shaft when complete will be one of the best here—no loose ground, nearly all rock throughout.—Captain Phillips's Visit of Inspection: As mentioned in my last, Captain Phillips, who has been engaged at the Moonta, Paramatta, and Yelta Mines, and has seen the Burra and Kapunda lodes, has thoroughly and carefully inspected the mine, detaching pieces of the lode from all corners and various other parts. Upon his arrival on the surface he expressed himself to me as amazed at the magnificent deposit of ore we had in this place, and says, in effect, that there is nothing to be compared with it in South Australia. Capt. Terrell reports, under date of March 20—Blinman Mine: In accordance with my last report, we have sollared over the shaft at the 25, and commenced sinking and stoping on a very nice lode of ore, which we cut through in sinking, and which I am pleased to say has greatly improved. The stopes between No. 3 shaft and No. 1 winze and those above the 10 are looking much the same as when last reported. I do not think we shall have much change in the mine until we have direct communication to Hill's lode by means of the new engine-shaft, the making of which I will push on with all speed. Ore raised and smelted 187 tons; copper made 16 tons 6 cwts. 2 qrs. Everything points to a favourable season.

PORT PHILLIP AND COLONIAL (Gold).—March 24: The quantity of quartz crushed during the four months ending March 1 was 5113 tons; pyrites treated, 80 tons; total gold obtained, 1831 ozs. 5 dwts., or an average per ton, including pyrites gold, of 5 dwts. 23¾ grs. The receipts were 5740*l.* 4s. 10d. Payments—ordinary, 3754*l.* 13s. 8d.; firewood, &c., account, 866*l.* 10s.: total, 4621*l.* 3s. 8d. Profit, 1099*l.* 1s. 2d., added to which was last month's balance of 2011*l.* 5s. 4d., thereby making an available balance of 3110*l.* 6s. 6d. The amount divided between the two companies was 1200*l.*, the Port Phillip Company's proportion of which amounts to 780*l.* The balance of 1910*l.* 6s. 6d. was carried forward to next month's account. The return for the two weeks ending March 15 is as follows:—Quartz crushed, 2593 tons; pyrites treated, 30 tons. Total gold obtained, 655 ozs. 10 dwts.; or an average per ton, including pyrites gold of 5 dwts. 1 1-3rd gr. Remittance, 800*l.*—Telegram dated Galle, May 13, in anticipation of the mail leaving Melbourne April 23, and due here June 10 next:—Month ending March 29—yield, 5 dwts. 8 grs. Three weeks ending April 19, 5 dwts. 3 grs. per ton. Remittance, 600*l.*

SCOTTISH AUSTRALIAN.—The directors have advices from Sydney, dated March 24, with reports from the Lambton Colliery to the 23d of that month. The sales of coal for the month of February amounted to 11,659 tons. The coal trade continues slack.

ENGLISH AND AUSTRALIAN (Copper).—Port Adelaide, March 29: The quantity of coal at Port Adelaide was about 1232 tons. There were three furnaces at work at the Port Works—one smelting, one roasting, and one refining. Since the date of last advices about 70 tons of copper had been shipped, and a further quantity of 50 tons was in course of shipment.

YORKE PENINSULA.—The directors have advices from the committee of inspection at Adelaide, dated March 28, with reports from the Kurilla Mine to the 25th of that month. The mine was drained to the 25 fm. level by March 3, and Capt. Anthony commenced to drive through the "horse," or unproductive part of the lode. He reports, "After repairing Hall's and Deebie's shafts I set the 15 to drive west of Deebie's, to four men, at 9*l.* per fathom; the price is now reduced to 7*l.* per fathom, and the men to receive 2s. 6d. in 1*l.* for any ore they may save. The lode when driving was commenced was not more than 3 in. wide, and no ore; it is now 18 in. wide, composed of feruginous quartz, pyrites, and copper ore, and is showing signs of further improvement; this, considering that only 3 fms. have been driven, is a decided improvement. The 25 is now driving by four men also west of Deebie's, at 10*l.* per fm., and 2s. 6d. in 1*l.* for ore. During the driving, in all about 2 fms., the lode has continued to enlarge, and to produce more quartz, pyrites, and copper ore than formerly. I have no doubt that when those levels are driven further west into the mica formation that still greater improvement will take place, but up to date the improvement has been steady and satisfactory."

AUSTRALIAN UNITED (Gold).—Mr. Kitto, Fryerstown, March 27, writes—"Central Mine: The tributers to whom I let the Central Mine (see my letter No. 35) did not work it in accordance with my wishes, and, as the contract was not finally settled, I ousted them. They got into some good ground, and worked it as seemed best in their own eyes. They made wages, and during the last week in February realised 99 ozs. 19 dwts. 18 grs. of gold—nearly 400*l.* The mining manager, on my expressing dissatisfaction, resigned. I called for fresh tenders for working the mine, and thoroughly opening it, for a period of eleven months. I have accepted the tender of Mr. McLaren and party; they are to pay a tribute of 15 per cent. on the gross yield of gold. Looking at the short period for which it is let, and the amount of 'dead work' that has to be done, the terms, although not so good as I would have insisted on were I in a position to dictate, may be considered favourable, as one of the conditions is that the mine is to be left at the end of the term in a perfect state for working, and machinery ditto. My new mining captain is Capt. Lean, of the London and Melbourne, a person highly recommended by Messrs. R. H. Bland and John Munday, of Clunes.—Duke of Cornwall Mine: I had long ago determined to sink the present main shaft (Dauke's) no further; indeed, I was in doubt as to the last 60 ft., and regret now having sunk it that lift. When this shaft was started the lode had only a gradual and slight underlie, and I did not expect to touch it until the shaft was 300 ft. deep. It has, however, gone so rapidly towards the east that at 300 ft. the lode will be fully 250 ft. east of the shaft, provided always it keeps its present course. There is a shaft (Lamb's) 400 ft. to the north and 250 ft. to the east of Dauke's shaft, now down a depth of 110 ft. in beautiful ground, which was stopped when the funds run short; this will be one of the main shafts for the future working of the reef. From a very large branch, or lode, the magazine, in the vicinity of this shaft (dipping, apparently, perpendicularly into the main lode), we have been getting a little quartz during the past month, 110 tons of which yielded 35 ozs. of gold. In order to utilise Lamb's shaft for the purpose of winding this stuff, we have been driving through 'dead stuff,' some 450 tons of which yielded nothing; it was a mixture of quartz, sandstone, and slate, and it is evidently non-auriferous; however, this does not interfere with the yield of gold from the magazine lode, from which, in future, we shall be able to obtain, to all appearances, a very large supply."

STARTING A NEW ENGINE AT WHEAL OSBORNE.—One of the best discoveries of tin in Cornwall for many a long year appears to have been made at Wheal Osborne, where on Saturday last the starting of a new engine was celebrated with great rejoicings. Wheal Osborne is situate about seven miles from Camborne and four from Marazion, very near to the villiage of Townshend. It has excellent neighbours, being in close proximity to such splendid properties as Godolphin, Great Work, Wheal Vor, and the Great Western mines; whilst directly across the valley which separates them stand West Great Work and South Great Work, on the west of Godolphin hill. Some years since a working miner, named Daw, sunk a small shaft on the present Wheal, Osborne sett, and for years without attracting any attention made a very good living by working a lode, the ore from which he drew out by means of a windlass. In about six years he got out about a thousand tons, and sold it to a neighbouring mine for nearly 900*l.* A very few months since the attention of Captain Carkeek, of Camborne, was drawn to the spot, and, with a ready decisiveness which has marked all subsequent proceedings, he obtained a sett from the Duke of Leeds on liberal terms. There was no difficulty whatever in forming a company, for Captain Carkeek's reputation was sufficient to get the list closed in two days; and there was no delay in trying to get at the good things believed to be hid beneath the soft velvety turf. Just two months since the position of the engine-house was decided on, and by Saturday the building had been erected, a 40-inch cylinder engine fixed in it, and the shaft sunk (about 50 yards west of Daw's shaft) to the depth of 15 fathoms. So far the the mine has exceeded the most sanguine expectations of the prometers, the lode and cross-courses met with being uncommonly rich. All who have been underground, and have examined the ore, believe Wheal Osborne will be a good and lasting mine, and that it is the forerunner of many a new work which ere long will start up around it. Already one sett has been taken up by Captain Reed, of Wheal Lewis, &c., and named Wheal Cardell. The alacrity with which the works have been commenced is said to be without a parallel in the history of the county. The engine was erected by John Hockin and Sons, Redruth, and started with admirable ease amidst loud cheering. The mine buildings and houses at Townshead were gaily decorated with flags, and the scene was a very animated one. After the ceremony of starting the engine, an influential party sat down to an excellent repast, provided in the open air on the mine. About one hundred attended, the working miners—men and boys—sitting down with the rest of the party; whilst bread and meat were given away *ad lib.* to about 100 children. At the dinner Captain Carkeek (the manager) presided, and the vice-chair was filled by Mr. Stribley. The after-dinner speeches contained much interesting information concerning the mine and its prospects.—*Western Daily Mercury.*

DUDLEY AND MIDLAND GEOLOGICAL AND SCIENTIFIC SOCIETY.—The members of this field club visited Cannock Chase, on Wednesday. Among those present were—Mr. Madeley, secretary; the Rev. Mr. Thompson, Mr. E. F. Smith, agent to Earl Dudley, Messrs. G. Taylor, Riley, Professor Becket, S. Boukley, F.G.S, T. Parton, F.G.S., Dr. Fraser, De Lessert, and others, to the number of about 30. At the Huntington Gravel Pits, near Shore Hill, they were met by Mr. Daniel Jones, F.G.S., and Mr. Randall, F.G.S., of the Severn Valley Field Club, and then proceeded to inspect the quarry, where several specimens were procured of various rocks of different ages, and where some encrinite sterns, joints, corals, and other carboniferous and Silurian fossils were met with. After inspecting these beds Mr. Daniel Jones offered some observations upon the features of the district. One of the most important matters, he said, for enquiry was as to the nature of the strata lying between the gravel pits and the recent sinkings of the West Cannock Colliery Company. The Government Survey Maps showed that the pebble beds of the lower New Red Sandstone prevailed in that district. If that were the case it would seem that they lie immediately upon the coal measures, without any intervening Lower Bunter or Permias. The surface, however, showed some indications of a considerable deposit of alluvium and drift, part of which would be attributable to the northern drift from the blocks of granite and syenite which are to be met with. Small brick-yards have been established in parts of the district where local deposits of clay occur. They contain many pebbles, and are more or less intermingled with the sand and gravel surrounding them. Such patches cannot be referred to the Bunter or pebble beds. The cutting in the branch railway from Hednesford to West Cannock pits shows a section which is undoubtedly in the alluvium. If the pebble beds exist below the alluvium it is impossible to say without some sinking to test it, as there are no natural sections from which any decision can be arrived at. The general opinion seemed to be that no Permians intervened between the pebbles and the coal measures. Mr. Jones spoke of the recent sinking at Aldridge, and said that he had been paying attention to the subject. It was not difficult to make out correlation between that district and Essington. All the representations of the Thick coal were passed through. (Applause.) The party then proceeded to the Teddesley Hall, where they were kindly entertained by Lord Hatherston, and afterwards inspected the new West Cannock Colliery, where the deep and shallow coals have just been found.

CRACROFT'S CONSOLS DIAGRAM.—A handsomely-printed sheet showing the highest and lowest prices of 3 per cent. Consols in each year from 1789 to 1870, with the growth and decline of the funded debt of Great Britain, yearly average of bank rate of interest, and statement of principal events affecting the prices of stocks, has just been issued (through Mr. Effingham Wilson, of the Royal Exchange) by Messrs. CRACROFT, of Austinfriars. The diagram reflects great credit upon the compiler, Mr. R. R. Mabson, and will be found extremely useful for reference in the offices of merchants, stockbrokers, and others, while the record of events given in the chronological table will be perused with interest by those who do not require to consult it for business purposes.

THE LOCK OF HAIR.—An interesting and admirably written little volume, entitled "The Lock of Hair; its History, Ancient and Modern, Natural and Artistic," by ALEXANNA SPEIGHT, has just been published (London: 20, Spencer-street, Goswell-road), and contains, in addition to a good account of the absurdities which have prevailed in the dressing of the human hair from the time when Solomon had his forty pages running before him with their hair powdered with gold until the introduction of chignons, a complete description of the art of working in hair. In this description the details are given so carefully that any lady of ordinary intelligence may quickly become a proficient artist in hair, and the work she can then produce will be a credit to herself and an ornament to her dwelling. The work is abundantly illustrated, that the description may be readily understood.

CHEMICALS AND MINERALS.—(Messrs. J. Berger Spence and Co., Manchester, May 18).—Soda: Cream caustic animated, at 12*l.* to 12*l.* 10s.; white at 13*l.* 5s. to 13*l.* 10s.; soda ash continues scarce, at 2*l.* to 2½*l.*; soda crystals firm, at 5*l.* 10s. to 5*l.* 15s.; bi-carbonate, 12*l.* to 12*l.* 10s.; salt cake, 3*l.* 2s. 6d.; glauber salts, 3*l.* 2s. 6d.—Nitrate of Soda: Quiet, at 15*l.*—Potash: Muriates, 80 per cent, no improvement, at 9*l.* 5s. to 9*l.* 7s. 6d. Potashes, old, 33s. 6d.; new, 34s. 6d. Pearl ashes, 39s. Prussiate: Red, 2s. 2d. to 2s. 3d.; yellow, 1s. 2d. to 1s. 3d. Chlorate, 1s. 2d. to 1s. 3d.—Saltpetre: Fair business. Refined, 33*l.* to 34*l.*; foreign, 27s. 6d. to 29s.—Alum: 6*l.* to 6*l.* 5s. for loose lump; in export barrels, 7*l.*; ground, 7*l.*—Bleaching Powder: Not so firm, at current price of 13*l.* to 14*l.*—Ammonia: White and grey, 18*l.* to 19*l.*; brown firm, at 14*l.* to 14*l.* 5s.; carbonate, 6¼d. to 6½d.—Iron Salts: Green and rusty copperas, good enquiry, at 52s. 6d. to 55s.; dry copperas, 52s.; chloride of iron, 6*l.*; Prussian blue, 1s. 2d. to 1s. 6d.—Copper Salts; Sulphate of copper, 23*l.* to 24*l.*—Arsenic, at 6*l.* 15s. to 7*l.* 5s. for fine powdered.—Acid: Tartaric easy, at 1s. 4d. to 1s. 4½d.; oxalic, 9d. to 9½d.; sulphuric, 3*l.* 10s. to 3*l.* 15s.; carbolic, 1s. 1d. to 1s. 2d.—Magnesia: Epsom salts, 4*l.* 10s. to 4*l.* 17s. 6d. for refined.—Oils: Olive, business moderate, at 47*l.* 10s. to 49*l.* Spindle, loom, and dense oils, at 4s. 6d. to 6s. per gallon. Pure white Norwegian cod liver oil, 4s. 6d. to 6s. per gallon.—Pitch: Stagnant, at 13s. to 15s.—Benzole: 30 per cent., meagre transactions, at 2s. 9d. to 3s.—Disinfectants: Patent, at 5*l.* per ton; carbolic, 10*l.*—China clay, 22s. per ton.—Pyrites: Unchanged, 7d. to 8d. per unit. for Spanish.—Phosphates: Superphosphates, 25 to 30 per cent., 3*l.* 10s. Precipitated phosphate of lime, 40 to 50 per cent, 5*l.* 10s. to 6*l.* 10s.; Estramadura, 1s. 2d. per unit; mineral phosphates, 55 to 60 per cent., 10¼d. per unit.—Manganese, 70s. to 90s. for 70 per cent.—Iron Ore: hematite, 19s. to 20s.; oolitic, 6s. 9d. to 7s. 6d.

TUNNELS AND TUBES.—Messrs. T. B. DAFT and C. E. CRAWLEY, Fleet-street, form tunnels of a continuous length of iron wound into a helical coil, so as to form a continuous tube, the several coils being made to butt one against the other to form a close joint. Where it is required to form an air or water tight tunnel the coils where they butt one against another may be caulked with packing placed in a groove, or channel, formed between the coils. It is preferred to employ iron of a trough section, and to coil it so that the side flanges of the trough iron in the successive coils come one against the other. Tunnels may be made sufficiently large for the transit of goods and passengers by railway trucks and carriages. The flanges of the successive coils may be riveted, or otherwise connected to one another.

COPPER ORES.

Sampled April 26, and sold at Swansea, May 16.

Mines.	Tons.	Produce.	Price.	Mines.	Tons.	Produce.	Price.
Moonta Ore.	91	16½	£10 7 0	Paramatta..	52	15½	£10 1 6
ditto.....	91	16½	10 7 0	ditto.....	50	17¼	10 12 6
ditto.....	76	14⅞	9 9 0	ditto.....	49	17¼	10 12 0
ditto.....	75	14⅞	9 7 0	ditto.....	41	17¼	10 12 6
ditto.....	70	17⅛	10 16 0	ditto.....	40	16⅜	10 11 0
ditto.....	70	17⅛	10 16 0	ditto.....	44	15¾	10 0 0
ditto.....	100	14½	9 2 0	ditto.....	43	15⅞	10 0 6
ditto.....	96	16⅜	10 6 0	ditto.....	42	15¾	10 1 0
ditto.....	95	14⅞	9 2 6	ditto.....	41	15¾	10 1 0
ditto.....	95	16½	10 11 0	Knockmahon	95	7½	4 14 6
ditto.....	78	18⅛	11 15 0	ditto.....	93	7⅞	4 16 0
Cape Ore....	63	31½	20 10 6	ditto.....	81	8⅜	5 10 0
ditto.....	62	31½	20 8 6	Bradda	45	7	4 10 0
ditto.....	61	31½	20 9 6	ditto.....	42	6⅞	4 8 0
ditto.....	61	31½	20 8 6	Dyfngwm ..	55	8¼	5 5 0
ditto.....	50	30½	19 17 0	Copper Ore..	23	12⅜	8 0 0
ditto.....	49	30¼	19 15 6	ditto.....	23	11½	7 5 6
ditto.....	48	30⅛	19 18 6	Cop. Sludge..	3	24⅜	15 3 0
ditto.....	49	28¾	18 15 0	Copper Ore..	20	19½	12 13 6
ditto.....	49	28¾	18 16 6	Leghorn	26	11¾	7 1 0
ditto.....	48	28¾	18 17 0	Terriccio....	7	12½	7 15 0
ditto.....	4	26	16 15 0	Copper Reg..	9	33¼	21 0 0
ditto.....	2	29⅞	19 6 0	Copper Ore..	7	20⅛	12 11 6
ditto.....	48	34½	22 10 6	ditto.....	7	6⅞	3 13 0
ditto.....	15	26⅛	17 12 0	Cop. Precip..	6	11¾	6 13 0
ditto.....	3	35	22 14 0	ditto.....	8	25½	16 1
ditto.....	12	37¼	24 6 6	Telhadella..	1	25½	16 11
ditto.....	2	37¾	24 10 6	ditto.....	4	15	9 11
ditto.....	14	54¼	35 4 0	Slag	28	4¼	1 17
Paramatta..	52	15⅜	10 2 0				

TOTAL PRODUCE.

Moonta Ore.....	987	....	£9499 11 6	Copper Ore	20	....	£253 10
Cape Ore	640	....	13070 16 6	Leghorn	26	....	188 6
Paramatta	454	....	4662 12 0	Terriccio	7	....	84 5
Knockmahon	269	....	1340 15 6	Copper Regulus	9	....	189 0 0
Bradda	87	....	387 6 0	Copper Ore	14	....	113 11 6
Dyfngwm.....	55	....	288 15 0	Copper Precipitate..	14	....	169 16 0
Copper Ore	46	....	351 6 6	Telhadella	5	....	34 17 0
Copper Sludge ..	3	....	45 9 0	Slag	28	....	52 10 0

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Names.	Tons.	Amount.
Copper Miners' Company	181½	£2620 10 0
P. Grenfell and Sons	240	2824 3 0
Sims, Willyams, and Co.	215	2193 11 0
Vivian and Sons	512¼	5349 0 0
Williams, Foster, and Co.	335	1635 13 6
British and Foreign Copper Company	241	2087 8 0
Mason and Elkington	263	2738 2 0
Charles Lambert	310	3886 16 6
Ravenhead Copper Company	48	904 16 0
Sweetland, Tuttle, and Co.	268	3477 7 6
Total.....	2614	£30,717 7 6

NO SALE on June 6.

TOTALS AND AVERAGES.

	21 cwts.	Produce.	Price.	Per unit.	Standard.
Whole sale..	2614	18¼ ..	£11 15 0	12s. 10½d.	£ 86 0 0

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